

103

REVIEW OF THE FEDERAL GRAIN INSPECTION  
SERVICE'S PROPOSED REGULATION TO PRO-  
HIBIT THE ADDITION OF WATER TO GRAIN

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Y 4. AG 8/1:103-38

Review of the Federal Grain Inspect...

HEARING  
BEFORE THE  
SUBCOMMITTEE ON GENERAL  
FARM COMMODITIES  
OF THE  
COMMITTEE ON AGRICULTURE  
HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRD CONGRESS

FIRST SESSION

OCTOBER 7, 1993

Serial No. 103-38



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# REVIEW OF THE FEDERAL GRAIN INSPECTION SERVICE'S PROPOSED REGULATION TO PROHIBIT THE ADDITION OF WATER TO GRAIN

THURSDAY, OCTOBER 7, 1993

HOUSE OF REPRESENTATIVES,  
SUBCOMMITTEE ON GENERAL FARM COMMODITIES,  
COMMITTEE ON AGRICULTURE,  
*Washington, DC.*

The subcommittee met, pursuant to call, at 10:35 a.m., in room 1300, Longworth House Office Building, Hon. Tim Johnson (chairman of the subcommittee) presiding.

Present: Representatives Glickman, Volkmer, Long, Minge, Pomeroy, Stenholm, Sarpalius, Smith of Oregon, Ewing, and Smith of Michigan.

Staff present: Vernie Hubert, chief counsel and legislative director; Gary R. Mitchell, minority staff director; John E. Hogan, minority counsel; Dale Moore, minority legislative coordinator; Glenda L. Temple, clerk; Anne Simmons, Anne Kennedy, John Riley, and Neil P. Moseman.

## OPENING STATEMENT OF HON. TIM JOHNSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF SOUTH DAKOTA

Mr. JOHNSON. The subcommittee will come to order.

This is the General Farm Commodities Subcommittee, public hearing on the review of the Federal Grain Inspection Service's proposed regulation to prohibit the addition of water to grain. I will make my statement brief this morning as we have a full slate of witnesses, and I would encourage my colleagues to do the same, that is, to make their statements as succinct as possible and their questions as direct as possible.

The full Agriculture Committee marked up H.R. 2689, which would extend the fee collection authorities of the Federal Grain Inspection Service through 1998 on September 22. A great deal of time was spent on the issue of what, if any, legislative action should be taken in regard to the addition of water to grain.

Despite the debate, no consensus was arrived at by the members of this committee, and after the bill was cleared of any mention of water and pending amendments withdrawn, I indicated to my colleagues that this Subcommittee on General Farm Commodities would hold a hearing on the issue.

This is what brings us here today. The House having passed H.R. 2689 via the suspension calendar on September 28, and the Senate

having passed S. 1490 the next day, with a majority of their language very similar to the House version, but with a couple of glaring differences, most notably, the mandate that the Administrator of the FGIS must allow the addition of water to grain through the issuance of permits.

It is my hope today that we will shed more light on this subject, but I am not certain whether it will make the picture more clear for my colleagues and I. There are seemingly legitimate arguments to be made on all angles of this issue.

With that, I would conclude my statement and ask if any of my colleagues have opening statements they would like to make.

I recognize and noted that Mr. Emerson will try to join us when he can as ranking minority member, but I would recognize the gentleman from Oregon, Mr. Smith, for any opening statement he might have.

Mr. SMITH of Oregon. Thank you, Mr. Chairman.

Following your advice, I only want to suggest I think you were wise in holding hearings separately from the reauthorization bill, because this is a very complex issue, and I would hope that we could find some resolution, keeping in mind that the marketplace is probably the most important driving force in this whole discussion.

Mr. JOHNSON. Thank you.

Mr. Ewing.

Mr. EWING. Mr. Chairman, I will defer to the comments made.

I look forward to the hearing. I think it is an issue we definitely need to try and find a compromise on.

Thank you.

Mr. JOHNSON. The gentleman from Texas, Mr. Sarpalius, do you have any opening remarks?

Mr. SARPALIUS. Mr. Chairman, I have some remarks, but if it is permissible I will just submit them to the record so we can get on with the testimony.

Mr. JOHNSON. Without objection, the opening statements of all members of the subcommittee are received for the record of this hearing at this point.

[The prepared statements of Mr. Glickman, Mr. Sarpalius, and Mr. Emerson follow:]

OPENING STATEMENT BY  
 THE HONORABLE DAN GLICKMAN, (D-KS)  
 FOR THE GENERAL FARM COMMODITIES SUBCOMMITTEE HEARING TO REVIEW  
 THE FEDERAL GRAIN INSPECTION SERVICE'S PROPOSED REGULATION  
 TO PROHIBIT THE ADDITION OF WATER TO GRAIN

October 7, 1993

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I thank the Chairman for having this hearing today to discuss whether water should be added to grain for purposes of dust control. During Committee consideration of the FGIS reauthorization bill, we decided, because of the complexity of the issue, not to legislate the issue, but to leave it in the hands of the Federal Grain Inspection Service to decide. During my years as the Chairman of the Wheat, Soybeans, and Feed Grains Subcommittee, I found that FGIS has a very good reputation, like no other agency, for involving the entire industry when important issues like this have to be resolved. While I still believe in a water prohibition, I am supportive of allowing the regulatory process work.

The Senate, on the other hand, chose another course. Its bill requires the Administrator to allow the addition of water to grain through the implementation of a water permit system. I strongly object to this effort to micromanage such a complex issue as this one. Not only would Congress be permitting water, but it would be mandating a specific watering system, a system about which Congress knows very little. Even worse, the Senate provision flies in the face of the Committee's promise to the entire nation, and particularly the agricultural community, to reduce programs, requirements, and red tape.

The majority of the grain export industry solidly supports the prohibition of water and, to my knowledge, only one grain export company wants Congress to mandate the water permit system. Let me remind you that this particular company is under investigation by the federal government for improperly adding water. At the very least, I ask the Committee to wait for the completion of this investigation before legislating. I would not want Congress to do anything which may have either a direct or indirect effect on this investigation and a possible indictment.

Mandating a water permit system at the request of one company out of thousands will cost FGIS and the grain industry a lot of money, and we all know who will get stuck with that bill - the producer, in the form of lower prices. In addition, by mandating a water permit system, we stymie any innovation within the industry and Department in solving this issue. As you will hear today, other people have ideas which need studying.

Finally, improving our grain quality to enhance our competitiveness has been an outstanding goal for years and this issue goes right to the heart of it. According to the National

Grain and Feed Association's letter to Senator Daschle regarding the Senate's water language:

To our knowledge, there is very little information currently available to assess accurately the grain quality implications of this practice. . . It also does not address questions about the quality implications associated with repeated applications of water to grain by successive handlers in the marketing chain if [water] permits become widely adopted. Furthermore, this legislative provision does not address the effect water application may have on the confidence of domestic and foreign buyers in the quality of U.S. grain.

This letter from the National Grain and Feed Association, which represents thousands of grain facilities, concludes by respectfully urging Senator Daschle and Congress to remove the Senate's water language to allow the regulatory process to move forward without specific mandates. Furthermore, I believe, after having spent billions to improve grain competitiveness, it would be foolish of us to mandate a system and a policy that may reverse the gains we have made.

Again, I thank the Chairman for holding this timely hearing and encourage my colleagues to stand firmly behind the House position on this issue.



## Opening Statement- Congressman Bill Sarpalius

Date: October 7, 1993

I want to thank the Chairman for taking this opportunity to have a hearing to review the Federal Grain Inspection Services' proposed regulation to prohibit the addition of water to suppress grain dust. I understand there's great controversy in adding water to grain to suppress dust. However, we must look at the safety aspects that the use of water provides to suppress grain dust in country elevators.

A FGIS and Kansas State University report showed that since 1983, there have been 154 grain elevator explosions and fires which claimed 27 lives and resulted in 132 injuries. In 1981, I was Chairman of the Texas State Senate Agriculture Committee when the Corpus Christi grain elevator exploded in which many

lives were lost. We held field hearings in Corpus Christi - Dr. Calvin Parnell from Texas A&M joined us down there to investigate the situation. I certainly believe that worker safety is of the utmost importance when deciding this issue.

Again, Mr. Chairman, thank you for having a hearing on this issue. I hope we are able to come to an understanding concerning the value of the use of water for dust suppression when handling grain. I certainly look forward to hearing the testimony from the witnesses.



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STATEMENT OF CONGRESSMAN BILL EMERSON  
HOUSE AGRICULTURE GENERAL FARM COMMODITIES SUBCOMMITTEE  
OCTOBER 7, 1993

Mr. Chairman, I thank you for holding this important hearing today so that we may more fully examine the issue of water addition to grain. The Federal Grain Inspection Service is presently considering regulations that would prohibit the addition of water to grain; therefore, the subject of today's Subcommittee forum is both timely and important.

I believe most would agree that the safety of those who work in grain elevators, export facilities, processing plants, and other grain handling and transport arenas is paramount. We have all seen the tragic aftermath of explosions caused by grain dust and I can safely say those of us here today wish to ensure that such terrible tragedies never happen again. I understand we have several witnesses here today who have seen firsthand the devastation caused by grain dust explosions and I look forward to their insights on how we can eliminate the loss of life and property in the months and years ahead.

I primarily have twofold concerns today. One, of course, is safety and to ensure that those men and women involved in the handling of grain are afforded the safest conditions possible in order to protect their livelihoods and indeed, their very lives. My other concern

involves fairness and ensuring that the farm producers who deliver their grain to the local elevators or river port facilities are allowed the fairest and most sensible marketing practices available.

Farm producers face strict grain quality guidelines when delivering their grain to local grain facilities and they pay the price in both discounts and dockage for grain that is below accepted or industry driven standards. Agricultural producers understand this. What they do not understand are rules that are not fairly applied to those in the grain handling and marketing industry.

Today, I wish to ensure that our grain handling practices are indeed the safest they can be and that our nation's farm producers are treated as fairly as they should be. I look forward to the testimony today and the further elaboration on this important matter.

Mr. JOHNSON. We will move to the first witness, the Honorable Eugene Branstool, Assistant Secretary for Marketing and Inspection Services, accompanied by Mr. David R. Galliard, Acting Administrator, Federal Grain Inspection Service, Mr. David Shipman, Director of FGIS's Field Management Division, and Mr. Kay Stang, Grain Marketing Specialist, Compliance Division.

And with that, Mr. Branstool, we welcome you here. We appreciate any insights that you would share with this subcommittee on what has become a very controversial and somewhat contentious issue.

We invite you to summarize your statement if you feel most comfortable doing that, but in any event your full written statement is received for the record by this subcommittee. So you may proceed.

**STATEMENT OF EUGENE BRANSTOOL, ASSISTANT SECRETARY, MARKETING AND INSPECTION SERVICES, U.S. DEPARTMENT OF AGRICULTURE, ACCOMPANIED BY DAVID GALLIART, ACTING ADMINISTRATOR, FEDERAL GRAIN INSPECTION SERVICE, DAVID SHIPMAN, DIRECTOR, FIELD MANAGEMENT DIVISION; AND KAY STANG, GRAIN MARKETING SPECIALIST, COMPLIANCE DIVISION**

Mr. BRANSTOOL. Thank you, Mr. Chairman.

Mr. Chairman, members of the subcommittee, I appreciate the opportunity to discuss this question of adding water to grain. During the past 2 years, there has been a growing concern from virtually every segment of the grain industry about the use of water to control grain dust. I share this concern and feel that allowing this practice to continue will do irreparable harm to the reputation of U.S. grain in the domestic and world market as well.

In the August 4, 1993, Federal Register (58 FR 41439), the Federal Grain Inspection Service proposed rulemaking to prohibit the application of water to grain. Since publication, we have received almost 100 comments—95 percent of which support the proposed rule. It is quite apparent that a majority of the grain industry believes that the primary purpose for applying water to grain is not to suppress dust, but rather to adulterate grain, increase its weight, and therefore cheat the buyers.

Canada does not allow the addition of any water to grain. And I know of no other country that permits this practice that produces grain for export.

As a farmer myself, I feel that the United States produces some of the finest quality grain in the world today. I want U.S. grain handlers to safeguard that quality and not degrade it.

Adding water to grain increases the opportunity for mold growth and mycotoxin contamination. We need systems that promote and protect grain quality, not harm it.

I have this notion that if you cheat the customer, you ultimately cheat yourself. And we are in a very competitive world as it relates to our ability to export and sell our grain. It is not like the closing days of World War II, when we were essentially the only game in town. It is very competitive. And any time you would harm the quality of that product that you sell, you jeopardize the ability to increase those sales.

Most grain handlers share our concerns. Archer Daniels Midland, the Bunge Corporation, Cargill, Continental Grain, Louis Dreyfus, the Andersons, and over 50 farmer-owned cooperatives throughout the Midwest have come out strongly in favor of a complete ban on the use of water in grain. They know that water applied in even minute amounts will degrade quality and hurt the U.S.'s reputation in the international grain market.

End users also understand the problems caused when water is added to grain. A major Colorado cattle feeder recently wrote: "Raw water on grain increases weight unrealistically and reduces our ability to hold grain prior to processing and feed manufacture. The practice produces false weight readings and gives the impression the grain is of a higher quality than it actually is when delivered. Improper weight puts our nutritional blends in error and cattle performance can be inevitably adversely affected."

This same concern is echoed nationwide by poultry processors, dry millers, maltsters, and feed processors. The concerns of foreign buyers are even more pointed. They view the addition of water as unacceptable and question why it has taken so long to stop such a serious and obvious problem.

Grain dust is hazardous. But water is neither the best nor the most common method of dust control used today. In fact, research indicates that water is only minimally effective over the short term and provides virtually no long-term control. And, if we continue to allow the use of water, we risk driving up the cost of feed and processed grain products, and doing significant harm to the integrity of the U.S. grain exports.

Even though I believe that the use of water should be totally banned, I also recognize that there may be other viable alternatives. For this reason, the proposed rulemaking action solicits suggestions and provides an extended comment period to allow interested groups an opportunity to develop alternatives.

Concerning the range and number of groups that have already commented on this proposed rule, it is my opinion that the issue should continue to be addressed through the rulemaking process, rather than legislation.

Mr. Chairman, I have asked David R. Galliard, the Acting Administrator of the Federal Grain Inspection Service, to summarize for the subcommittee the effect that banning water will have on grain elevator safety and the problems that have already been caused by water use, and the difficulty in enforcing current or future restrictions.

I would be happy to answer any questions you may have at this time or at the conclusion of the other testimony. Thank you very much for the opportunity to be here today.

[The prepared statement of Mr. Branstool appears at the conclusion of the hearing.]

Mr. JOHNSON. Thank you.

Mr. Galliard, did you have anything to add to supplement the testimony of Mr. Branstool?

Mr. GALLIART. I would like to summarize my prepared statement.

Mr. JOHNSON. Why don't you proceed with that. I think that would be helpful.

**STATEMENT OF DAVID R. GALLIART, ACTING ADMINISTRATOR, FEDERAL GRAIN INSPECTION SERVICE, U.S. DEPARTMENT OF AGRICULTURE**

Mr. GALLIART. Good morning to you, Mr. Chairman, and the members of the subcommittee. As indicated by Mr. Branstool, Kay Stang is from our Compliance Division. He is working with the Office of the Inspector General on the investigation of applying water to grain.

We appreciate the opportunity to discuss the use of water to control grain dust. Unquestionably, water additives can suppress grain dust. The problem with water is not its theoretical effectiveness, but rather how it is used today and how it may be used tomorrow.

There is a growing concern throughout the grain industry about the use of water to control grain dust and the net effect of the practice on grain quality. We believe water is often used to increase weight and not to control dust. Unless action is taken, current economic pressures will push more elevators to add water.

Of the 84 comments received on our proposal to ban adding water to grain, 57 elevators, both terminal and country, have voiced support of the proposed action and concern about the practice of adding water.

With FGIS's assistance, the USDA's Office of Inspector General and the Department of Justice are currently investigating several suspected incidents of applying water to increase weight. They have encountered sophisticated as well as primitive application methods, both resulting in significant weight gain.

While it is difficult to assess how many of the 10,000-plus grain elevators in this country apply water to grain, FGIS is concerned that the number is growing due to the economic pressure and the apparent lack of industry or Government control. As the number of water users increases, so will the probability for abuse. For this reason, FGIS proposed a prohibition on applying water to grain except for certain processing purposes.

I come here today with a very clear understanding of the dangers of grain dust explosions. This is a serious issue for the grain industry and FGIS alike. In 1977, there were 20 grain elevator explosions resulting in 65 deaths and 84 injuries. Fifteen of those who died were FGIS employees.

Fortunately, since 1977, the number and magnitude of dust explosions has significantly declined due to a greater safety awareness and better engineering. Smoke and heat detectors, improved bearings and buckets, fire and explosion suppression systems, improved cleaning techniques, and better dust control methods have contributed to a safer work environment.

All of the active elevators in the United States have pneumatic dust collection systems. Nineteen also rely on a liquid dust suppressant. Of the 19, 16 use mineral or vegetable oil and the remaining 3 use water. Far less mineral or soybean oil is needed to control dust. To be effective, water must be applied repeatedly or used with other dust control measures.

The quality impact of adding water to grain is influenced by the condition of the grain, the method of storage, and the storage temperature. Under the best conditions, you are increasing the potential for mold growth and reduced storability when water is added.



Foreign and domestic processors share a deep concern about the effects of water on grain quality. Their concerns have been clearly stated in comments submitted to FGIS in response to our proposal to ban water being added to grain. Foreign buyers from Europe, Asia, Africa, and Mexico have voiced support for this proposal.

Adding water to grain increases the weight of grain but not its value. This invites tampering and misuse of water systems to increase profit. For example, adding as little as three-tenths of 1 percent of water to a 50-ton shipment of weight can increase the value an additional \$19,000 for the shipper.

The ongoing Office of Inspector General/Justice Department investigation may confirm that some grain elevators that apply water to grain are doing so in a manner inconsistent with sound dust control practices. The result is that facilities using water significantly increase their stock, while most grain elevators experience a shrinkage in stocks because of drying and handling.

Preventing this practice with current rules have been limited. Efforts to enforce the Food and Drug Administration rules have been largely unsuccessful because of the difficulty of proving intent, defining a small amount of water added to grain for safety purposes, and distinguishing the process of applying water for safety purposes from adulteration.

FGIS rules for the most part require a disclosure statement when water is applied. They do not regulate application. Some industry groups and individual firms have recommended FGIS regulate rather than prohibit the addition of water to grain for dust control purposes.

FGIS has concluded that regulation would not effectively prevent misuse and would create an economic incentive for all companies to apply water whether or not it is needed for dust suppression purposes.

Some have suggested marketing grain on a dry matter or standardized bushel basis instead of prohibiting or regulating the use of water. According to Dr. Lowell Hill of the University of Illinois, "Buying grain on this basis would remove the economic incentives for adding water to grain."

FGIS encourages industry in consideration of such market reform as an alternative to direct prohibition. I must emphasize this is a marketing issue outside of FGIS's authority.

In conclusion, grain dust is hazardous. But applying water will harm the integrity of U.S. grain exports. There are alternatives to water that are proven and effective methods for controlling dust. We believe our proposal to prohibit the addition of water reflects current market needs, would have a positive economic impact on the grain industry, and would ensure the integrity of U.S. grain in the domestic and international market.

Mr. Chairman, this concludes my statement. As I indicated earlier, Mr. Stang is present and ready to provide to the subcommittee some general comments about the investigation that is ongoing. His comments have been cleared through the Inspector General and the Department of Justice.

[The prepared statement of Mr. Galliard appears at the conclusion of the hearing.]

Mr. JOHNSON. Thank you, Mr. Galliard.

There may be members of the panel who want to go further into that current investigation. The Chair will impose the 5-minute rule on questions and answers. We will come around to a second round if there are additional questions members of the subcommittee may have. But we want to expedite things as much as we possibly can.

Mr. Galliard has touched on this, but I wonder if you would comment on the requirement in the legislation in the other body requiring a permit to govern water suppression of dust, whether you feel that FGIS will be able to come up with a regulation which adequately distinguishes between legitimate use of water and abuse, and second, whether you have the resources in terms of personnel and otherwise to procedurally monitor such a regulation if you are able to write one.

Mr. BRANSTOOL. Mr. Chairman, if there is any allowance for water, here is what I believe could happen in the trade. The grain trade is a very competitive—is very competitive commerce, and if it would be permitted under certain conditions, it may cause the rest of the industry to have to do that. And I would fear that the capabilities of us to be able to monitor, because once it would be allowed even in small quantities, the apparatus can be put in place to allow the addition of water into grain.

I think in the grain trade from not only the country collection point but the terminal and also points of exportation, and also including at the farm when the semi-trucks leave the farms—and if the farmer has over dried his grain or if it was a season of harvest that permitted the grain to come in overly dry at harvest, which can happen occasionally, I think we are opening up an entire area where people will participate and add water to grain.

There is only one other thing cheaper than water, and that is air, and air doesn't weigh anything. And I think if we cross that bridge to allow the addition of water to grain, it is very hard to detect because it is a natural thing for grain to absorb and receive moisture; that is how seeds sprout. And so it isn't like a quick test with milk; if water is added to milk, it can be very easily and quickly identified. With grain, that is almost impossible to deal with.

I think it will be very difficult for us, if this thing starts to be an accepted practice, even with permitting and in regulated amounts, I think we are opening a door that will cause us considerable grief down the road.

Mr. JOHNSON. In its testimony, FGIS asserts the implementation of a water system would be rather easy to use if you require the use of tamper-proof computerized controls to ensure the proper use of water. FGIS has asserted this would be costly and largely ineffective in controlling abuse.

I wonder if you would comment on some of the computerized systems you have seen and explain in some detail the difficulty of implementing a permit system using those suggestions.

Mr. BRANSTOOL. That is a technical question, Mr. Chairman, and I will ask David Shipman to answer.

Mr. SHIPMAN. Certainly with a computerized system in place we can have meters established where they are sealed and they are recorded. We can measure the amount of water being applied. The systems that we have seen also take into account the volume of grain being moved.

The concern that we would have is that while this system is intact, what we have seen in our reviews is that there are supplemental hoses around that can easily be used to apply additional water. And the concern is that we would be trying to determine or prove intent to misuse the now-approved system. If we review the situation and there is a nozzle that is malfunctioning, was it an inadvertent problem with the system or was it intentional for that nozzle to be adjusted so that it was applying more water than it should?

We would still be getting back to trying to prove the intent of misuse in the system. So that was one of our concerns. And the idea that it is easily supplemented with other hoses, as we have seen this occur.

Mr. JOHNSON. I wonder if you could very briefly comment on the use of oil and its relative effect on either degradation or weight versus water.

Mr. SHIPMAN. The research has shown that the use of oil at much lower levels provides effective dust control. It provides a residual effect so that you have lasting control versus water, where every time the grain is handled or turned, you have to apply additional water.

So first off, it has a residual lasting effect. Certainly there are some concerns from end users, mills, flour mills in particular, about having oil residue on the product when it is being milled. Those who are concerned in the domestic market, through contractual arrangements, agreed not to purchase grain with oil applied to it.

In terms of its effectiveness, all indications from research and what we have observed are that oil is effective. The other point is that we do not see overapplication because of the cost of the oil. It certainly costs more to apply oil than the water.

Mr. JOHNSON. Thank you.

I have a number of other questions but abiding by my 5-minute rule, I will recognize Mr. Smith of Oregon for questions that he might have.

Mr. SMITH of Oregon. Thank you, Mr. Chairman.

Mr. Shipman, you just stated that the marketplace is taking care of adding too much oil, in effect.

Mr. SHIPMAN. That is correct.

Mr. SMITH of Oregon. Why can't the marketplace take care of adding too much water?

Mr. SHIPMAN. That is a good question.

Mr. SMITH of Oregon. I think it is a good question.

Mr. SHIPMAN. It is a good question, and I think for a number of years now we have had a number of people come to us, both producers and grain elevators and importers, voicing concern about the water.

We have repeatedly tried to work with them to resolve it through the industry and at a local level. We find that they have been unsuccessful. Rarely does the grain industry come to the Federal Grain Inspection Service to ask for regulations.

Mr. SMITH of Oregon. I understand from a regulator's point of view that a ban is the easiest. That is obvious. I understand it gets somewhat dicey in controlling water and oil, for that matter.



Mr. Secretary, let me ask you, you said that air doesn't weigh anything, but aeration weighs something. In fact, a farmer who piles his grain outside on a moist day or a humid day can add 4 percent weight, moisture weight to the grain, can he not?

Mr. BRANSTOOL. Well, any time you have high humidity and you would choose to force air through your grain, there would be moisture that would gather with the grain, yes.

Mr. SMITH of Oregon. And I understand the tolerance level for these science-based, sophisticated water delivery systems is something like one-tenth of 1 percent addition of water for dust suppression; is that correct?

Mr. BRANSTOOL. I am not sure of the numbers but I would accept that. But what might be helpful is that Mr. Stang has done some investigation, and I think he could shed some light on the extent of the addition of water to grain that would be helpful in your discussion here.

Mr. SMITH of Oregon. I am just trying to make the point here that under controlled conditions, obviously 10,000 elevators are not going to be involved in the application of water, so the inspection is not going to be 10,000.

If you go to a permit system, you surely have the ability you do now to inspect these elevators that are already set up with a very sophisticated water application problem. I don't see how the people that, if they use water, can sell their product to anybody. You have already mentioned that.

Any of you who understand agriculture know that even in livestock, if I had fed my cattle at 3 o'clock in the morning and watered them at 8 o'clock and wake them at 9 o'clock, they would shrink a lot, wouldn't they?

Mr. BRANSTOOL. That is right.

Mr. SMITH of Oregon. And the marketplace then would demand that I couldn't get the price for them, or I would have to let the paper shrink in the sale. That is the way the marketplace takes care of these things.

Mr. BRANSTOOL. The one distinction I would make between trying to force-feed cattle water to increase their weight—there is some biological processes that will tend to equalize that, and many of the cattle are graded on the rail.

But with grain, the distinction is, I think, grain has a great propensity to absorb water. It is a natural phenomenon. That is how seeds germinate, when they absorb water. And so it does have this capacity to absorb water, and it is very hard to detect.

Mr. SMITH of Oregon. So do livestock.

Mr. BRANSTOOL. But the livestock can eliminate that water, don't you think, whereas grain can't.

Mr. SMITH of Oregon. Grain is tested, is it not, for moisture content when it is sold?

Mr. BRANSTOOL. That is right.

Mr. SMITH of Oregon. So anybody buying grain that has too much moisture in it knows that something happened, and that moisture is taken care of in the price, is it not?

Mr. BRANSTOOL. Of course, if the moisture exceeds what is viewed as, say, No. 2 corn, yes, there is a discount, but there is also

water added to grain between that. And that is why it is added to grain, because it increases the weight.

Mr. SMITH of Oregon. I think no one would quarrel with you that abuse of an additive that distorts quality or the weight is a practice that ought not to be followed.

The question I am having trouble with is, if we are going to ban water, then maybe we ought to ban all additions, aeration, oil, because the purpose of all three, when used legitimately, is to control dust, explosions, and danger and life loss. If we are going to pick on one, it is hard for me to understand how the marketplace could control the addition of oil and not water. You see my problem.

Mr. BRANSTOOL. I am trying to understand your question as it relates to using aeration. Most aeration that I know, at least from Ohio, it is not good to aerate in conditions of high humidity. You aerate grain, that is very important and essential, but you can cause yourself problems for that grain in storage.

Mr. SMITH of Oregon. But piled on the ground, Mr. Secretary, it absorbs moisture. If you have a big crop in the West, if you can't get to the elevator right away, you pile it on the ground. It absorbs moisture from the ground. You have a humid day. You have 4 percent, possibly up to 4 percent moisture content by natural conditions. And as I understand it, scientifically the water system program only adds one-tenth of 1 percent. My question is, why can't we fix it?

Mr. BRANSTOOL. I think the greatest concern is when we say, OK, we are allowed now to add water to grain. We say that is an acceptable practice, then we are opening the barn door, I fear, for greater abuse of this thing.

I suppose that the oldest trick in the world is to add water to something, whether it is added to milk, added to whiskey, added to whatever you do. And I feel this is what is going on now, and we have opened ourselves up to great grief.

Not to repeat myself, but to present a quality product to the foreign buyer, and our domestic users, there are cheaper ways to feed water to livestock than adding it into grain and increasing the value of the grain. That is where I think we are in trouble on this.

And again, if it is accepted as a practice, even with rigid controls, then we say to the farmer: "You know, your grain buyer is able to add water to grain; why don't you guys do it when you overdry your grain, or when it is an abnormal harvest and the moisture is way down?"

Mr. SMITH of Oregon. I know farmers don't do that today. I know that.

Mr. JOHNSON. The Chair recognizes the gentleman from Texas, Mr. Sarpalius.

Mr. SARPALIUS. Mr. Secretary, today when they add water to milk or whiskey or some of these other areas you are talking about, how do they catch them when they add water to milk.

Mr. BRANSTOOL. With milk there is a quick test that is very reliable, and at the point of delivery even the smallest quantity of water can be detected. With grain that is not the case.

Mr. SARPALIUS. Who does that test?

Mr. BRANSTOOL. With the grain?

Mr. SARPALIUS. No, with milk.

Mr. BRANSTOOL. At the point of delivery, at the receiving station where the milk is unloaded from the trucks, and where it is graded for fat content.

Mr. SARPALIUS. Who does that?

Mr. BRANSTOOL. The buyer.

Mr. SARPALIUS. Why can't the buyer do the same thing with grain?

Mr. BRANSTOOL. Because I do not believe the technology—but I will ask Mr. Shipman to articulate that.

Mr. SHIPMAN. You can not measure moisture in grain and distinguish between the moisture that was naturally occurring and that which was applied.

Mr. SARPALIUS. If I was a buyer and I was buying grain and I got a shipload of grain and part of the grain at the bottom of that ship had high moisture, was beginning to germinate or whatever the problem was, as a buyer I wouldn't buy it. And I would let the seller know that if you are going to put water in the ship before you ship this grain over to me, I am not going to pay the price you asked me to. And most buyers, they work on a contract basis. Why can't they put that in their contract?

Mr. BRANSTOOL. We have had complaints from buyers that—they have seen the mold start to develop. I understand there was a case where conditions were such that it froze and they couldn't remove the grain from the hold of the ship because of water added to grain.

Mr. SARPALIUS. How many complaints do you get on water in these ships that go overseas?

Mr. SHIPMAN. We don't have an exact number of complaints that are directly associated with whether water was applied or not applied. During this past year when our corn crop, for example, wasn't as good as it has been in the past few years, we have had increased complaints due to spoilage and damage and broken and so forth.

Mr. SARPALIUS. How many? How many would you get?

Mr. SHIPMAN. This year we have received 50 complaints.

Mr. SARPALIUS. How many shiploads do you think were shipped across the ocean?

Mr. SHIPMAN. Thousands.

Mr. SARPALIUS. Is there any way that if a ship is in a storm or anything like that, that water can get into that ship as it crosses the ocean?

Mr. SHIPMAN. Certainly.

Mr. SARPALIUS. Did you take that into account?

Mr. SHIPMAN. Yes, we take that into account.

Mr. SARPALIUS. If you had 50 complaints versus thousands of shiploads going across the ocean, and I want to follow up that one of the No. 1 concerns after applying water to begin with is from a safety standpoint, why do you want to outlaw or prohibit the use of water altogether?

Mr. SHIPMAN. We have about 5 percent of the elevators applying water right now. I am not saying that the 50 complaints were directly correlated with those locations. And in a typical year, we have about three or four, maybe a few more complaints than that. This past year we have had a substantial increase in the number

of complaints. We have, right now, about 5 percent of the elevators applying water to grain.

Our concern is if we set a limit and we say we will regulate it, that that number will significantly increase. Possibly all elevators will find it is necessary not only for dust control purposes but for economic purposes, competition reasons, that they apply water.

So we will have water repeatedly applied from the country elevator all the way through to the exporter. Our belief is if that occurs, the number of complaints will significantly increase above 50.

Mr. SARPALIUS. Are there any penalties today for somebody that is caught doing that?

Mr. SHIPMAN. The problem that we have today under the current Federal rules and the statutes is that it is very difficult to prove the intent of adding the water to increase the weight.

Mr. SARPALIUS. Thank you.

Mr. Secretary, in your statement you said that if we allow the use of water it is going to drive the cost of feed and processed grain products up. Explain to me what you mean by that.

Mr. BRANSTOOL. Let's say corn that would be destined to a cattle feedlot or a poultry growing operation, there is 56 pounds in a bushel of corn, so you add water to that. If you are given a choice between 100 bushels of corn that had water added or 100 bushels of corn that did not have water added, what would you prefer to feed to your cattle or poultry or whatever?

You can provide the water a lot cheaper than paying the price for corn and the soybean price, even  $2\frac{1}{2}$  times the price of corn.

Mr. SARPALIUS. Mr. Chairman, I would like to ask some follow-up questions, but I will wait until it is my turn again.

Mr. JOHNSON. Mr. Ewing.

Mr. EWING. Thank you, Mr. Chairman.

To anyone on the panel, is there any legitimate time when water could and should be used in grain handling? If we are to totally ban it, are we creating any problem where there is a legitimate use?

Mr. BRANSTOOL. Mr. Chairman, Mr. Ewing, I am not aware of any legitimate reason to add water to grain.

Mr. EWING. As even a carrier for oil or any other chemicals, insecticides? We often mix insecticides with water that we are spraying on the farm.

Mr. SHIPMAN. Under our proposal, the use of water as a carrier for pesticides or in processing, such as malting and so forth, is fine. Your question was, is it legitimate for handling purposes, and we know of no reason to add water for handling purposes.

Mr. EWING. No reason that it couldn't—some other element such as oil couldn't be used; is that correct?

Mr. SHIPMAN. That is correct.

Mr. EWING. To anyone on the panel, do we believe that if we ban the use of water, that any of the other elements that we might use to control dust would be problem free? Are there chances for abuse of them?

Mr. BRANSTOOL. There are other technologies to deal with dust suppression, and therefore the legitimate concern for safety—

Mr. GALLIART. There is always a chance for abuse in anything, of course.



In the matter of adding oil to suppress dust, the cost of oil is so high that, in and of itself, it is a deterrent to using oil in excess. Those are our findings.

As far as the matter of collecting dust through a pneumatic system, I don't know that there is any abuse, at least that I can think of.

Adding oil to grain or using a dust-suppression system is a companion with good housekeeping and all the other safety features that are involved in running a grain elevator.

Mr. EWING. I like the point that you made that there are chances of abuse of almost any system and I think some of those have been pointed out today. Under your proposal, to what level would regulation go? To every farm operation?

Mr. BRANSTOOL. If there would be a prohibition of the adding of water to grain, and remember, the Federal Grain Inspection Service, we inspect all exports, all shipments of grain to foreign countries, but we would say that you cannot—it is not an accepted practice to add water to grain.

Mr. EWING. If that were the rule, though—I am trying to question as to how that could be enforced down at the farm level. That is not your responsibility. Now you inspect grain as it is shipped in our ports.

Mr. SHIPMAN. We have a responsibility since 1986 to prohibit the adding of dockage and foreign material to any grain. And that is at all locations for anybody handling grain. This water prohibition would be handled in a very similar manner.

Mr. EWING. What type of action do you take to inspect at the farm level?

Mr. SHIPMAN. We do not inspect at the farm level.

Mr. EWING. So it is not enforced at that level?

Mr. SHIPMAN. We do not review at the farm level. But enforcement is based on information we receive. We do get calls occasionally from people saying that something's going on that is illegal. And we will investigate it. And that is how we would handle the water.

We believe that in the case of water, if there really is an economic incentive to apply it, and we believe that this is true, if someone in this neighborhood or the town was applying water at one elevator, we would hear about it from the competitors.

Mr. EWING. So there wouldn't be an intention to have a swarm of inspectors riding over the countryside. I mean, if you want to create problems for members of this committee in agricultural States, that would do it.

Thank you.

Mr. JOHNSON. Mr. Volkmer.

Mr. VOLKMER. I am still not satisfied that there is never, or could never be, a proper use of water as a spray in an elevator to suppress dust. That is what I hear from this panel; is that correct?

Mr. BRANSTOOL. Yes, sir.

Mr. VOLKMER. Even in minute quantities?

Mr. BRANSTOOL. This subject came up earlier, and if you permit the addition of water to grain, then you open this thing up.

I mentioned in my testimony that Canada allows no water to be added in grain. They are fierce competitors. I know of no other

country in the world that allows the addition of water to their grain. And, I suppose a case could be made that a very minute amount would not adversely affect the quality of grain.

But when you say that some is permissible, I think we open this thing up for great abuse.

Mr. VOLKMER. Then you do not really trust the American businessman and the people who are processing the grain?

Mr. BRANSTOOL. I think—the answer, Mr. Volkmer and Mr. Chairman, there will be people who will take advantage and add water to grain for the purpose of improving the value of that grain. I believe that is called cheating the customer. And when you cheat the customer, as I said in my opening statement, you cheat yourself.

Mr. VOLKMER. Why do some of the companies then use oil?

Mr. BRANSTOOL. I think it has been mentioned that 5 percent of the companies will use water, and a very small number of the companies either add oil or water. But there are some cases where they believe that oil is the best way in which to do that. And the science indicates that oil is more effective than adding water to grain for dust suppression.

Mr. VOLKMER. What affect does oil have on the grain?

Mr. BRANSTOOL. Oil has the capacity to absorb dust, as you would understand. Some people believe that it is not—some customers do not want oil added to their grain. Some find it acceptable.

Mr. VOLKMER. I don't think you will find much oil added to wheat. I don't think you will find many customers who want oil on their wheat. I am not saying you should have water either. What I am trying to get to is, if I spray a bunch of oil on a bunch of beans or corn, doesn't that add weight?

Mr. BRANSTOOL. Yes, it would add weight, but the oil in the process, the cost of the oil would exceed probably the value of the grain itself, and therefore there would not be inducement or incentive then to engage in that practice. Whereas with water, few things are cheaper than water.

Mr. VOLKMER. I won't deny that. But you are saying that because the oil is more expensive, they won't do it for that purpose. But if there is no reason to do it, if we are going to say water shouldn't be added, why shouldn't we say oil shouldn't be added?

Mr. BRANSTOOL. Because oil is viewed as an acceptable practice, and—

Mr. VOLKMER. It adds weight.

Mr. BRANSTOOL. I do not believe they are using the quantity of oil as they are the quantity of water. And I will mention again our investigation, we have the person here who has conducted that, and I believe can shed some very interesting information on that subject.

Mr. VOLKMER. I would like to hear that.

Mr. JOHNSON. The Chair would suggest that we conclude general questions of the panel and then we may as a final point turn to observations on the ongoing investigation.

Mr. VOLKMER. I would like to hear that.

Mr. JOHNSON. We will do that at the conclusion of the panel.

Mr. VOLKMER. Fine.

Mr. JOHNSON. Mr. Branstool, if we were to have a water permit system, presumably there would have to be more inspectors to monitor that closely. Would you anticipate that that would involve significant fees, and would you comment on the likelihood that the cost of those fees will ultimately be passed back to the producer?

Mr. BRANSTOOL. I think that of course if we would have a permitting system and permits would have to be issued and there would have to be an oversight of that process, it would be costly, it would require more effort in order to do that.

I think as to who pays the bill of that nature, generally the producer is the ultimate payor of an increased cost that way. The market seems to work that way, at least in my judgment.

Mr. JOHNSON. The water permit system has been described as economically harmless. People differ on that. The end result is that it could add weight to grain, which means more money.

I wonder if you could spell out how much money is made per shipload of grain—trainload—using the proposed water system. If you could in your experience tell us, what amounts of money are we talking about here?

Mr. BRANSTOOL. There is one example I could cite, and it is believed that if as little as three-tenths of 1 percent of water that would be added to a 50,000-metric ton shipload of wheat, just of wheat, the increase in weight would be worth about \$19,000 in value.

The Wall Street Journal conducted—they did a story several weeks ago—I believe we have that to present to you if it would be of value—but on a shipload of soybeans, I believe it indicated it enhanced the value of that commodity by \$37,000, just on one shipload.

And remember, the addition of grain is not only our concern on export market, but also the domestic market as well. The grain that is used in milling, cattle feeding, poultry feeding, and dairy feeding, and so forth.

Mr. JOHNSON. Would you share with us how many comments, roughly, you have received on your proposed regulation, and how it breaks down in terms of support in opposition?

Mr. BRANSTOOL. As of, I believe, yesterday, October 6, we have received 84 comments on our proposed rule that would ban the addition of water to grain. Seventy-eight of those 84 were in support of the ban, of eliminating the addition of water to grain. Ninety-three percent support what we are proposing to do.

Mr. JOHNSON. Would you comment on whether the prohibition of water would result in farmers and/or small community elevators being required then to use much more expensive alternative methods to suppress grain dust?

Mr. SHIPMAN. If I may, certainly if additional installation of pneumatic systems is required to meet their quality standard or the safety standards they apply, those will be more costly than water.

But the comments we are receiving are coming from country elevators, are coming from small elevators that are faced with meeting those requirements from OSHA or EPA or their own company policy, and they are supporting the ban. So apparently they are able to meet those tough standards with the current technology.



Mr. JOHNSON. Do you have any idea how many elevators within the United States currently use water?

Mr. SHIPMAN. On the export side we know that out of the 63 export elevators, there are 3 that apply water. It is our estimation that approximately the same percentage would be on the domestic market, which would be about 5 percent, but we do not have specific statistics.

We have asked our statisticians about what it would take to conduct a survey to find that answer out. We would have to go through the process of getting clearance to conduct a nationwide survey to determine exactly how many elevators are using water.

Mr. JOHNSON. There has been concern expressed about roving bands of FGIS investigators checking up on people if we did not have a water permit system. But if you have a water permit system, wouldn't you at least as likely be then required to have even more investigators out checking for abuses of the water system?

Mr. SHIPMAN. We believe if we have a permit system it would require more resources to enforce than if we have an outright ban. If we have an outright ban, it is black and white; the rule is you don't apply water. If somebody is applying water, we typically get information from different sources that it is happening and we conduct an investigation.

If we have a water system where it is permitted to apply a certain amount a certain way, we are going to have to go in and periodically conduct audits to determine whether that system is operating as approved.

Mr. JOHNSON. Again, I will abide by my own time limitation rule. The gentleman from Oregon.

Mr. SMITH of Oregon. You mentioned that adding three-tenths of 1 percent to 50,000 bushel, I guess it was—

Mr. BRANSTOOL. Metric tons.

Mr. SMITH of Oregon. Metric tons, creates \$19,000. That is with the addition of water. I suppose the same thing could be true of addition of oil; is that right?

Mr. BRANSTOOL. If the equivalent quantity was used, yes.

Mr. SMITH of Oregon. So three-tenths of 1 percent of oil or water creates—how much is 50,000 metric tons of wheat worth?

Mr. BRANSTOOL. If you will give us a moment to calculate it.

The oil will cost more than the grain. And I believe we could probably provide you information on that more accurately.

Mr. SMITH of Oregon. Is it three-tenths of 1 percent?

Mr. BRANSTOOL. Congressman, just because it is a small quantity, usually the oil, depending on what its derivative is, oil is worth more than soybeans.

Mr. SMITH of Oregon. I know, but we are adding three-tenths of 1 percent. My point is you raised this issue of water. The same thing applies to oil.

Mr. BRANSTOOL. Except water is much cheaper than oil.

Mr. VOLKMER. Will the gentleman yield on that?

Mr. SMITH of Oregon. If will you give me a little more time, yes.

Mr. VOLKMER. I will give you all the time you want.

Mr. SMITH of Oregon. I will yield.

Mr. VOLKMER. I would like for you to tell me, I have read in the statement where I have to use so much less oil than water to sup-



press the dust, so I want you to figure and get back to me sometime the actual cost to use oil as against water.

Thank you.

[The information follows:]



United States  
Department of  
Agriculture

Federal Grain  
Inspection  
Service

P.O. Box 96454  
Washington, DC  
20090-6454

October 15, 1993

Honorable Tim Johnson  
Chairman, Subcommittee on  
General Farm Commodities  
Committee on Agriculture  
House of Representatives  
1301 Longworth House Office Building  
Washington, D.C. 20515-6001

Dear Mr. Johnson:

This is in response to questions regarding the application of oil to grain that were posed during the October 7, 1993, public hearing on the Federal Grain Inspection Services' proposed regulation to prohibit the addition of water to grain. Specifically, several committee members asked if grain elevators could benefit financially from applying mineral or soybean oil to grain, as they might by applying water to grain.

Many elevators are currently using oil-based dust suppression systems. These systems use either USP white mineral oil or food grade vegetable oil (e.g., soybean oil). Unlike water systems, there is no financial incentive to increase weight with an oil system. As mentioned during the testimony on October 7, adding as little as 0.3 percent water, by weight, can significantly enhance the small margins the grain industry operates under. For example:

By applying water at a 0.3 percent rate to a 50,000 metric ton (mt) shiplot of wheat, an exporter could (excluding subsequent evaporation) add 150 mt's of water to the shipment. If the wheat was sold for \$128 per mt, the water could generate over \$19,000 in additional profit for the shipper.

As indicated during the testimony, far less oil than water is needed to control dust. Food, Drug, and Cosmetic Act regulations restrict the rate that mineral oil may be applied to not more than 0.02 percent, by weight. Unlike water, which is virtually free, oil is relatively expensive (approximately \$2 per gallon). As a result, adding as little as 0.02 percent of mineral oil to grain can reduce the elevators gross profit, not increase it. And, as the rate of application increase, so does the elevator's costs. For example:

By applying mineral oil at a 0.02 percent rate to a 50,000 mt shiplot of wheat, an exporter could add 10 mt's of oil to the shipment. If the wheat was sold for \$128 per mt, the oil could generate over \$1,280 in additional profit for the shipper. However, the 10 mt's of oil (equal to 2,857 gallons) would cost the shipper \$5,714. As a result, the shipper would lose over \$4,000 by applying oil at its recommended rate.

For this reason it would seem unlikely that oil would be over-applied as is water.

In addition to the financial disincentives, oil is superior to water in that it is adsorbed (adheres) in grain, thereby providing long-term dust suppression. Water, on the other hand, is either absorbed (soaked-in) into grain or evaporates, and therefore, must be repeatedly applied. This means that the grain may be sprayed with water three or more times from the time it enters the elevator until it leaves, amounting to an almost 1.0 percent water weight gain.



The Federal Grain Inspection Service  
is an agency of the  
United States Department of Agriculture

Honorable Tim Johnson

2

FGIS believes that adding water to grain increases the weight of grain without adding to its value, and that this invites tampering and misuse of the water systems to increase profit.

Sincerely,

A handwritten signature in dark ink, appearing to read "DR Galliant". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

David R. Galliant  
Acting Administrator

Mr. SMITH of Oregon. If 5 percent of the elevators are using the water, that is roughly 500 elevators. Isn't it possible to devise a rule by which you could permit what I have seen as state-of-the-art, large investment, small nozzle spray devices in elevators that work, and therefore not endorse water use throughout the whole country, but try to determine if you want to use water, you have to comply with some very strict standards. They are by your statements not over 500, if there are that many, who are using water at this point. But they must face some very strict and enforceable mechanisms that can be easily implemented and enforced. Is that a possibility?

Mr. BRANSTOOL. It seems to me, Mr. Smith, that as we get into the thing of saying some water is acceptable, then we allow through a permitting system, or whatever you would have proposed there, the installation of apparatus that will allow the addition of water to grain. I think we are doing ourselves a great disservice.

And again, I think there will be some testimony that will follow. This grain business is very competitive, and when members of the grain industry that sell are fearful that if the practice is allowed it will probably cause others to add water to grain to stay competitive, and once we open that barn door, as I have said, I think we are asking for some grief that could affect our ability to be providers of high-quality grain.

Mr. SMITH of Oregon. You see, Mr. Secretary, I am having a great deal of difficulty with this issue simply because we know that water has been added to grain as long as people have been buying and selling grain. Farmers are not all devious. I can say some are because I come from an agricultural background. You don't have to buy very many cattle to understand how folks make their way around weights and artificial kinds of wind structure.

But people have probably been putting water on their grain forever. The people that do that don't have a market, or they are discounted heavily in their price because grain is sold on moisture content.

For you to say that suddenly we are going to say one-tenth of 1 percent or three-tenths of 1 percent added water to grain is going to allow everybody to throw water on grain, that doesn't make any sense to me. Does it make any sense to you?

Mr. BRANSTOOL. Yes, it does, or I wouldn't be here testifying, Mr. Smith.

Mr. SMITH of Oregon. I guess you are right about that. That is my problem.

Anyway, thank you. My time has expired.

Mr. BRANSTOOL. Mr. Chairman, one thing I might say, I think the results of our investigation will shed additional light on this.

Mr. JOHNSON. The Chair recognizes the gentleman from Texas, Mr. Sarpalius, for this round of questioning.

I don't want to cut anybody off from exercising their additional round of questioning, but we do want to expedite things, get on to some comments from Mr. Stang, and then we do have other panels. So I do encourage the membership to be as concise as possible.

Mr. Sarpalius.

Mr. SARPALIUS. Thank you, Mr. Chairman.

Do you all inspect every grain elevator?

Mr. BRANSTOOL. No, we don't.

Mr. SARPALIUS. Which ones do you inspect?

Mr. SHIPMAN. We don't necessarily inspect grain elevators in the domestic market. If somebody would like their grain inspected or weighed, they request it and we go in and do the inspection and weighing for them.

At the export, we are at each export elevator and we inspect all exported grain.

Mr. SARPALIUS. So basically, the roughly 500 elevators that my friend from Oregon was talking about, are those country elevators he is referring to that you were referring to are they export elevators? What type of elevators are we talking about?

Mr. SHIPMAN. As I mentioned, we know three export elevators that apply water. We do not have active information on the domestic market. But based on conversations with individuals and the information we do have, we believe there is no greater use in the domestic market than in the export market. So we assume there is around a 5 percent use.

Mr. SARPALIUS. Out of those three export elevators that use water, how often do you inspect those?

Mr. SHIPMAN. We are in those elevators daily inspecting the grain.

Mr. SARPALIUS. Can you not, as a regulatory agency, do a more efficient job of trying to catch people who are sticking hoses in ships or doing whatever they are doing to add water to it?

Mr. SHIPMAN. I think the concern isn't so much the direct, blatant application with a firehose as it is that USDA establish a limit that everybody will try to meet. If we go out and say it is OK to put three-tenths of 1 percent of water every time you handle the grain, it is our concern that that will begin to occur from country elevator all the way to export.

Mr. SARPALIUS. Mr. Secretary, I was really concerned about a statement you made when you said that you were not aware of any legitimate reason to add water to grain. Have you ever thought about the safety aspect?

Mr. BRANSTOOL. I think I have acknowledged in my testimony the safety aspects. I think, as I understood the context of the question, there were other legitimate reasons to add water to grain. I thought that is what the question, the record would indicate what the question was.

Mr. SARPALIUS. Have you ever seen a grain elevator that has exploded?

Mr. BRANSTOOL. I have seen pictures.

Mr. SARPALIUS. Have you ever been at one?

Mr. BRANSTOOL. No, I haven't.

Mr. SARPALIUS. I have been at one. I mean, they are not a pleasant sight at all. When you see one that has exploded like that, it makes you want to try to do something to prevent that from happening again. That is why OSHA, the EPA, and the Government has put all these standards on elevators to eliminate the grain dust. And the cheapest way of doing that is using water. Unfortunately, not all elevators make enough money where they can utilize and buy expensive fans or use mineral oil or other things that are available to them.



Now, I admit there is some abuse. There are maybe some rotten apples in the barrel. But I can't help but wonder, does that mean we ought to go to the extreme in the other direction and maybe becoming a little more lax from a safety standpoint, at the expense of those few rotten apples in the barrel?

Why don't we look at what we can do to do a more efficient job in the line of enforcement? And that is what your responsibility is.

Have you looked at other areas of what you could do to be more efficient from an enforcement standpoint?

Mr. BRANSTOOL. Mr. Chairman, Mr. Sarpalius, I do not want to minimize the importance of safety in the grain industry or anywhere else. I would just call attention to the fact that there are a large number of the people in the grain elevator business that have also raised the question about the addition of water to grain, that they believe it to be a bad practice and a bad long-term business practice.

I am not diminishing safety. But I will say to you that you will see some pictures of our investigation where water was used in grain elevators, and it has caked the bearings on the belts and—

Mr. SARPALIUS. I am not disputing that. I said that there are some people who have abused it. But, because of those few people that have abused it, does that mean we ought to tell everybody now that you can never use water to eliminate dust in elevators?

Mr. BRANSTOOL. I can only say: I believe we should not allow the addition of water to grain.

Mr. SARPALIUS. Have you thought about the aspect of having tougher penalties to those people who do use water from a standpoint of trying to gain more weight or abuse their customers or looking at it from a stronger punishment standpoint?

Mr. BRANSTOOL. Mr. Chairman, Mr. Sarpalius, I believe we have conveyed to you that it is very difficult to make a determination if excessive water has been added at the loadout site. It is very difficult. Once you allow the apparatus to be in place, we can't have people there at every moment of grain being handled or loaded onto trucks, barges, or ships. It is a practice that we believe is not in the best interests of the entire grain industry, including the farmers that produce it.

Mr. JOHNSON. The Chair recognizes the gentleman from Michigan, Mr. Smith.

Mr. SMITH of Michigan. Mr. Chairman, very briefly. I need help in understanding why the marketplace can't control some of the fears that you enumerate. The reason that you add water, whether it is at the producer level or the country elevator or the export terminal, in addition to controlling the dust and safety, is for weight.

I don't really understand why the grain trade isn't willing to say that we are going to pay this kind of premium for the 12 percent corn and this kind for the 13 and up to 15. If that were the case, regardless of who that buyer might be, foreign elevator, a country elevator, or domestic, then there wouldn't be that incentive to add the water beyond the point that it is adding to safety by suppressing dust.

Mr. BRANSTOOL. Mr. Chairman, Mr. Smith, if a system could be worked out to buy grain on a dry-matter basis, I believe you are exactly right. It would eliminate the incentive and inducement to

do that. I will be bold and say it will probably eliminate a good share of what water is added to grain right now, under the banner of safety.

Mr. SMITH of Michigan. You don't have to change all the way to a dry-matter basis. Currently on the moisture basis, it is the producer who loses. In a market situation that doesn't pay any more for 12 percent moisture corn than for 15 percent moisture, it is the farmer who suffers.

The farmer doesn't have the ability to mix the higher moisture in a good fashion with the lower moisture. Sometimes that farmer might take a water hose and decide to bring that 12 percent up a little bit. But since that farmer doesn't have the capacity to test the moisture level, he delivers to market without any additional payment. If the producer is unfortunate enough to deliver low moisture grain that is later blended with higher moisture grain or water the farmer is never reimbursed.

So it seems to me that if we are concerned about how farmers and producers are being treated, which I think most of this subcommittee is, then we should look more aggressively at a system that is going to pay that producer for not only the quality but the moisture level of that product.

Mr. BRANSTOOL. Mr. Smith, I think witnesses will follow—there is a witness I believe who wants to discuss that very proposition.

Mr. SMITH of Michigan. I will accept that as an answer.

Mr. Chairman, thank you.

Mr. BRANSTOOL. I mean as a possible remedy to deal with the possible abuse of adding water to grain.

Mr. JOHNSON. If the gentleman yields back, we have had first notice of a vote. I think rather than proceeding and having the next question interrupted by the last call, which should be coming very soon, we will recess the subcommittee for now, vote, come back as quickly as possible, and pick up where we left off with this second and hopefully last round of questioning of this panel. So we will do that now, but come back as quickly as possible.

We are in recess.

[Recess taken.]

Mr. JOHNSON. We will call the subcommittee back to order.

Some of the members who have indicated to me they had a number of inquiries have not returned. I think we have waited an ample amount of time, and if they are not back, they are not back. They may present written questions of that nature to this panel, but I do want to expedite things.

Mr. Pomeroy of North Dakota, I believe, had a question.

Mr. POMEROY. Mr. Chairman, thank you.

The question I have involves the agency's opinions as to whether this watering, allegedly for dust suppression, has been a relatively recent development?

Mr. SHIPMAN. The development of computerized, more sophisticated systems for the application of water as a dust suppressant, yes, is a more recent development.

Mr. POMEROY. Is it the feeling of the agency that this might lead to a competitive advantage for entities that have invested in systems like this in light of added weight to the grain treated in this fashion?

Mr. SHIPMAN. Yes, it is.

Mr. POMEROY. Is it then the opinion of the agency that this relatively new development driven by competitive forces could become more widespread in the marketplace?

Mr. SHIPMAN. Yes.

Mr. POMEROY. Does the agency receive reports of foreign comments, questions or concerns about U.S. grain quality even before this recent practice?

Mr. SHIPMAN. Yes, we have over the years received comments from foreign buyers about concerns on quality.

Mr. POMEROY. And in a competitive global market, might perceptions about a deteriorating quality on U.S. grains, particularly in light of a bad rap they already have received, hinder our international competitiveness for exporting these commodities?

Mr. SHIPMAN. That is our concern, yes.

Mr. POMEROY. I might just add, Mr. Chairman, it is my concern as well. We think we have produced some of the best wheat produced anywhere in North Dakota, and when we get reports from foreign buyers and complaints about the quality, we know that that has been a development that has occurred somewhere after the product has left the farmers' hands that deliver it to the elevator.

Anything that might represent further deterioration of quality is something of gravest concern to us, both in reality and in perception, because both are important. If there is a perceived diminished quality, that of course will affect exports as well.

So I think this goes beyond just a few rotten apples in the barrel. In fact, if there is a broad perception of rotten grain in the hold, it is going to simply impact our ability to export product. Is that your concern?

Mr. SHIPMAN. Yes.

Mr. POMEROY. Mr. Chairman, that concludes my questions.

Mr. JOHNSON. Mr. Volkmer.

Mr. VOLKMER. I have no further questions.

Mr. JOHNSON. The Chair will be interested in some brief overview from Mr. Stang relative to the current status of the investigation. And we have some time constraints, but I think it would be of great interest to the subcommittee to know where you are and where you see this proceeding.

Mr. Stang, if you could enlighten us in that regard.

Mr. STANG. Thank you, Mr. Chairman.

Approximately 18 months ago a USDA investigation consisting of representatives from the Office of Inspector General, the Agricultural Stabilization and Conservation Service, and our Federal Grain Inspection Service looked into the matter of the application of water to grain. And we found that many elevators with water dust suppression systems often fail to use the water system as designed for controlling dust at critical safety points, but rather exploit the system's capability to increase grain weight.

Our task force discovered the use of firehoses to apply a steady stream of water to grain on conveyor belts, elevator legs, and in elevator spoutings. I have exhibits A and B to demonstrate those two applications.



Mr. JOHNSON. Without objection, those exhibits are received as part of the record of the subcommittee. If they could be passed around, it might be of benefit.

[The exhibits are held in the committee files.]

Mr. STANG. Exhibit A shows an elevator that went to the extent to drill an additional well and insert a pump to be able to elevate the water from the well to the top of the elevator with sufficient pressure to attach a firehose and apply it to the grain as it went to the storage bins prior to shipment out.

The idea behind the application was to treat the grain in the storage bins and raise the moisture level of that grain up to 18.5 percent on corn. This grain was then mixed with drier grain in storage and was shipped out to meet target limits of 15 percent per train average and no car to exceed 15.5 percent moisture.

As you can see, there was a crude plywood panel that was drawn up to insert on top of the conveyor panel on which the firehose was inserted to apply the water to the grain.

Additionally, at another facility, exhibit C, goes to the extent of showing how the elevator went to conceal the apparatus for applying the water to grain. The water pipes were in a false grain chute, entirely there for concealment purposes.

Exhibit D shows another location where water could be applied to grain with a firehose. This was taken at an export location, and it just demonstrates our difficulty as we perceive it in how to regulate the application of water to grain if, as the previous testimony said, this becomes an industrywide practice.

We also repeatedly found dust-suppression systems misused. Application points at the critical dust control points such as the bottom of a truck dump before the grain is elevated into the house, the nozzles were nonfunctional, and the pressure was disconnected and the pipe was not even inserted into the system.

Additionally, at the same location, once the grain was elevated to the top of the house, another system with a nozzle that was supposed to be in place, the nozzle was completely missing and water-flow was being applied to the grain that is exhibit E.

Additionally, as a result of water application to grain, we found poor housekeeping practices on many of the facilities that were using water. Excessive buildup of caked material around belt end bearings we feel are creating extra safety hazards in these elevators.

We went in to take a look at what the market impact was on applying water to grain. The task force found that at one elevator that was shipping grain with a water system, compared in the same town with an elevator that did not have a water system, they were buying grain from the same competitive farmers and the same local elevators.

They enhanced the weight of the grain by 1 percent, and we are correlating that with the weight of the outbound shipments of grain that were officially inspected by FGIS. That is exhibit G.

Exhibit H we plotted for one of these elevators we went into all the elevator receipts for a 3-month period. They averaged about 13.5 percent. We also traced the outbound railcars on 3 occasions on the amount of water that was added to the grain as it was shipped out. They averaged about 14.5 to 15 percent, basically a 1-

percent increase difference between the amount of moisture content on inbound grain as opposed to outbound grain.

Our task force visited the facilities on March 27. We have then another figure that shows what the water level was after the investigative team had hit this particular facility. And it goes back in correlation with the inbound grain moistures.

As the charts show, we are demonstrating approximately a 1-percent increase in the moisture weight ratio. A 1-percent moisture gain on  $\frac{1}{2}$  a pound weight gain per bushel for 56 pounds of corn amounts to a 2.5 cents per bushel for \$2.50 corn, which is what the previous charts demonstrate.

We also looked at some export elevator records as to what was happening in the position of the house 2 years before the investigation took place and 1 year after the investigation started. While most elevators struggle to minimize loss and shrinkage due to handling, the facility in exhibit I had stock increases. We believe these long positions are closely related to water applications. And the figures that we calculated range from \$3 million a year for the year before the investigation to now a \$1,187,000 increase. We believe this is closely associated to a water application rate of three-tenths of 1 percent per elevation.

The task force has also been concerned about the impact of water application to grain as to grain quality. We recognize that there are many variables that influence whether the application of water to grain will create a quality problem. The original moisture level, the grain condition, and temperature all play a role.

However, we believe it is fair to say that adding water to grain increases the possibility of incurring quality problems, especially as elevators strive to hit the target moisture level of 15 percent.

Our investigative interviews with elevator management generally gravitate toward three main points. Good grain handling practices incorporate dust control through the removal of the dust, not the adherence of the dust to the grain through the use of water. For instance, transferring the problem to the mill or the export customer is not the solution. Finally, grain with added moisture resulting in increased amounts of fine foreign material in the grain stimulates molds, mycotoxins, and insect proliferation.

This is further demonstrated by exhibit J that shows the first 40 cars of a 65-unit train that was shipped from the interior—from a Midwest market—to a poultry house in the South. This train went out at the target moisture rate of 15.5. The original damage on these grains averaged between 3 and 4 percent. These origin moistures and origin damage figures were from official inspections authorized by FGIS.

We also have the damage at destination at the end of a 7-day trip. We have damage migration from 3.1 percent to 7 percent, 3.8 percent to 19 percent, 4.4 percent to 11.3, on and on.

Exhibit J shows the effect of that, and as a result, 24 cars of that 65-car train were rejected by the buyer at destination.

That pretty much capsulizes my comments regarding weight enhancement and quality problems. I want to go into one other issue that we find happening in the marketplace with the addition of water to grain. And that has to do with the ability for foreign material to cling to the individual grain kernels.

Exhibit K is a picture of a flat storage warehouse. When we found this particular facility, there were two of these flat storage warehouses that contained ground and toasted soybean hulls. These hulls were moved to a conveyor pit and were dumped into the pit as moist soybeans were moving through the grain.

This material, as exhibit L shows, is of the consistency of flour. Everybody knows what happens when you add water to flour. The color of this material is almost the same color as the natural soybean. It is very difficult for our inspectors to determine when this particular application has been applied.

But what we did find is that the domestic elevator was increasing the FM in their shipments of soybeans to an export elevator per contract. In other words, the export elevator was buying excess foreign material to apply to their shipments in export to maximize FM contract requirements.

Mr. Chairman, that concludes my remarks.

Mr. JOHNSON. Thank you, Mr. Stang, for your overview of the progress you have made and your findings.

I would encourage members of the subcommittee to be brief and to avoid going over questions and issues we have already discussed with FGIS. But if there are questions specific to Mr. Stang, we can proceed with that.

Mr. Sarpalius.

Mr. SARPALIUS. Let me just ask you again, how many of these grain elevators did you find that were abusing weight control like this?

Mr. STANG. Sir, we visited over 30 domestic and export facilities, and the abuse that we saw occurring was in excess of half of that, sir.

Mr. SARPALIUS. Half of it?

Mr. STANG. Yes, sir.

Mr. SARPALIUS. I thought we only had three elevators that used water.

Mr. STANG. Those were export, sir.

Mr. SARPALIUS. How many of the export elevators did you find?

Mr. STANG. That is still to be determined by the court, sir.

Mr. SARPALIUS. Out of these that you examined, were they only elevators that were using water?

Mr. STANG. No, sir.

Mr. SARPALIUS. Did you find abuse in elevators that were using mineral oil?

Mr. STANG. No, sir.

Mr. SARPALIUS. Not a single one?

Mr. STANG. No, sir. To clarify that answer, we were not looking for abuse of oil. We were looking for abuse of water.

Mr. SARPALIUS. Thank you.

Mr. JOHNSON. Mr. Volkmer.

Mr. VOLKMER. How do we explain the increase in moisture content in a trainload of grain that went to the buyer between the time it left and the time it got there?

Mr. STANG. We believe, and we don't have scientific evidence to fully support this, but we believe that when you take the high moisture grain, as I described it, as it was being held in the storage for 18 to 20 hours and blend that back with the dry matter corn



that is in storage, that when that grain is subjected to official inspection, immediately the current technology will give you a lower moisture reading than is actually in the car at that time. And 2 or 3 days later, the grain will equalize and a true reading will be obtained.

Mr. VOLKMER. Have you got scientific basis that the water will—

Mr. STANG. No, sir. That is only on our observation of what we see happening today.

Mr. VOLKMER. How much problem do we have in the Northwest with the use of water on grain?

Mr. STANG. I can only speak to those places that I have been to, sir.

Mr. VOLKMER. Have you been to the Northwest?

Mr. STANG. Yes, sir.

Mr. VOLKMER. How much of a problem have we got?

Mr. STANG. Well, let me say that it is not uncharacteristic of any place else that we have been. There is no greater problem in the Northwest than there is in any other part of the country.

Mr. VOLKMER. I am just reading this article that was in with one of these statements, by this person that wrote in the Wall Street Journal.

Mr. STANG. Yes, sir, we did have an indication that the rate of water that was being applied to the barges was so great that during the time that the barge left the Snake River and arrived at Portland for unloading, that the cold weather had frozen the bottom of the barge, and it broke the unloading equipment in its attempt to unload the barge.

Mr. VOLKMER. Is the use of water—so you found it in the Northwest. Did you find it in the Midwest?

Mr. STANG. Yes, sir.

Mr. VOLKMER. All parts of the Midwest? Where in Missouri?

Mr. STANG. Let me tell you the places I went and you can eliminate the rest. Our investigation covered Indiana, Illinois, Kentucky, Nebraska, Kansas, Louisiana, and the State of Washington.

Mr. VOLKMER. All right. In that investigation, did you find that there was what I will call abuse of the use of water in all those States?

Mr. STANG. Yes, sir.

Mr. VOLKMER. Were those at large elevators or country elevators or both?

Mr. STANG. Both.

Mr. VOLKMER. We also, as I remember the testimony at our last hearing, there was testimony that one major export elevator, and I don't remember if it is on the gulf or New Orleans or where it is, still uses water to put the grain into the freighters. Is that correct?

Mr. STANG. I think that previous testimony said that we are aware of three export elevators that use water.

Mr. VOLKMER. Three export.

Mr. STANG. Out of 63, is it?

Mr. VOLKMER. Are those three all down the gulf?

Mr. STANG. No, sir. There are two on the gulf and one on the west coast.

Mr. VOLKMER. Do they use the water as the grain is moved up into the elevator or do they use the water as the grain is moved out of the elevator into the freighter?

Mr. STANG. All of the above, sir.

Mr. VOLKMER. All of the above.

Thank you.

Mr. STANG. Normally at three-tenths of 1 percent per elevation.

Mr. VOLKMER. Three-tenths of 1 percent.

Mr. STANG. Per elevation. That is inbound, inhouse, and out-bound.

Mr. VOLKMER. Thank you, Mr. Chairman.

Mr. JOHNSON. Mr. Glickman.

Mr. GLICKMAN. Thank you. I apologize. I wasn't here earlier.

Mr. VOLKMER. Could I ask one other question? You said at the rate of three-tenths of 1 percent.

Mr. STANG. Per elevation.

Mr. VOLKMER. That is not with a firehose, which you have shown us, and that type of thing, is it?

Mr. STANG. No, sir. That is by nozzles.

Mr. VOLKMER. These firehoses and that type of operation, did you find that type of system prevalent within the areas which you inspected?

Mr. STANG. I would say that at least a fourth of what we looked at had used firehoses or some crude application of water to grain.

Mr. VOLKMER. Were those mostly in your country elevators?

Mr. STANG. Yes, sir.

Mr. VOLKMER. And the more you moved to the larger elevators, the more sophisticated the water system became?

Mr. STANG. Yes, but I won't exclude the fact there were water systems—firehoses—existing in these elevators also.

Mr. VOLKMER. Thank you, Mr. Chairman.

Mr. JOHNSON. Mr. Glickman.

Mr. GLICKMAN. Thank you very much.

Let me go through several questions. As you know, I am the culprit who brought this up originally in the committee. And I think this hearing is useful because it allows us to sensibly understand the issues.

If Congress legislated on this issue now, how would it affect, such as what is in the Senate bill, which requires a water permitting system, but if we were to legislate it, would it interfere with your investigation, Mr. Stang, and do you have any knowledge of whether any other law enforcement officials would fear that it would affect their investigation?

Mr. SHIPMAN. If I may, we have checked with the assistant district attorney who is involved with the investigation. If the legislation was passed as it is written in the Senate bill, yes, it would have a negative impact on the investigation.

Mr. GLICKMAN. You have been advised by the U.S. attorney's office that it would have an impact on the pending investigation in the Senate language?

Mr. SHIPMAN. Yes.

Mr. GLICKMAN. I assume that would be a negative impact on the investigation?

Mr. SHIPMAN. Yes.



Mr. GLICKMAN. Let me ask, the issue of cost of implementing a water permitting system under the Senate bill, I want to get this. As I understand that, I don't know exactly what those costs would be, but I understand the testimony has been that the costs would be so great that it would have to be passed on to producers. That is, you are talking about an expensive regulatory process. I don't want to put words in your mouth. Is that correct, or how would you articulate that?

Mr. SHIPMAN. Our concern is if we permit water to be applied, we would have many more elevators than we currently have adding water. And if we had permit systems at every location, it would become very costly. And if we charge a fee for it, the way the market works, it typically is passed back to producers.

Mr. GLICKMAN. Mr. Gallart at the FGIS, and Mr. Shipman, it is indeed possible you could decide to permit water under some limited circumstances without the use of a permitting system, right?

Mr. SHIPMAN. We have requested comments on our proposal and are open to alternatives to addressing the issue.

Mr. GLICKMAN. Now, let me get to the issue of state-of-the-art nozzles. One of the elevator companies came to me and showed me these state-of-the-art nozzles. Have you had a chance to see them in use?

Mr. SHIPMAN. We have seen a videotape of them in use. We have not been onsite to look at the facility that has been equipped with them, no.

Mr. GLICKMAN. And you don't know whether they work; you are just relying on the videotape; you have not physically seen if they actually work or know if they actually work?

Mr. SHIPMAN. Firsthand, no.

Mr. GLICKMAN. That implies secondhand something else.

Mr. SHIPMAN. We hear the reports that have come to us, again, from the company installing and the company using it, that this new system has no weight gain and no moisture gain. But before we did our review and gathered the information Mr. Stang just shared with you, we were also told that the systems were very efficient and very effective in not causing any problems. So I take it we need to look at the new systems.

Mr. GLICKMAN. Has anybody here, Mr. Stang or anybody else, ever seen a situation where a firehose has overridden a nozzle spray? Where you have a system in place where the nozzle didn't work and the firehose was used? Was that part of any of your investigation?

Mr. STANG. In most cases the firehose was used in absence of a nozzle system. At this time I would not care to address the auxiliary use of the firehose.

Mr. GLICKMAN. All right. With regard to safety concerns, again reiterating, both labor unions who will testify today are supportive of banning water because they are confident in the other systems available to control dust. Of course, it is their employees that would be affected, particularly the export elevators.

How would you characterize your position with respect to their position?

Mr. STANG. I would say that many elevator employees at houses that have used or have purported to use water for dust-suppressant

systems have told us in testimony they did not like the use of water, they did not like the use of water specifically because of safety problems.

Mr. GLICKMAN. Mr. Galliard.

Mr. GALLIART. Mr. Glickman, if I could add a bit to that, I mentioned to you at the markup, there are 63 export houses in the United States. Three of those export houses use water. The other 60 do not. And they have as much interest in safety as the three, obviously. They are using other systems.

Mr. GLICKMAN. Other systems. Let me get to one of the other systems, oil. I want to get this straight. Tell me again why people would not necessarily use oil as a way to increase weight like they might theoretically use water. As I understand it, you have said oil is more expensive to add than water. So you feel somewhat positive that people wouldn't add a lot of oil because of the cost; is that correct?

Mr. SHIPMAN. That is correct.

Mr. GLICKMAN. Again, I would like you to reiterate, is there any other exporting country in the world which adds water to grain as a dust suppressant or controller?

Mr. SHIPMAN. We know of none.

Mr. GLICKMAN. The Canadians, what do they use?

Mr. SHIPMAN. The Canadians have in their statute, I believe it is a statute or regulation, that you could permit it, but the Canadian Government does not issue any permits that allow the use of water.

Mr. GLICKMAN. Let me just close by saying that this has become a controversial issue, but I would say to my colleagues, Congress would be making a very serious mistake adopting the Senate language to this bill, because it would look like special-interest legislation affecting largely one company at a time, that there is a pending review and possible criminal review of this issue.

It may be that the FGIS should allow water under some circumstances, and we have talked about that when Mr. Galliard has been here before, and I assume the comments are perhaps providing you some options in some cases. But I think for Congress to mandate it right now would look like we have accepted lock, stock, and barrel the arguments at a very small part of the grain industry, in particular the grain exporting industry, when most of the testimony from that industry is on the other side.

I am not saying necessarily we should ban water under all circumstances. But I think at this stage it should be left up to the FGIS to make the decision based upon the factual data and the circumstances.

So I am going to be doing my best to make sure that the conferees do not tie your hands and require you to put into existence a permitting system that, quite frankly, is an indirect way of benefiting one part of the grain industry. I think that would be a serious mistake.

And I think it would also be a very embarrassing mistake from Congress' perspective. As I said, I don't want to make it so that legitimate efforts of suppressing grain dust are not impeded. But we don't want to get into this ball game of looking like not only are

we taking sides, but we are taking the side of somebody that is overwhelmingly in the minority on this issue.

So I thank you, Mr. Chairman.

Mr. JOHNSON. The Chair is in receipt of letters received by the FGIS, copies of letters received by FGIS from foreign customers. Without objection, I will accept those into the record.

[The information follows:]

# FEDIOL

## SOYA BEAN WORKING GROUP

Branche Foreningen for Oliefabriker IEF  
 Vereinigung der Olmühlindustrie der EG  
 "EC Seed Crushers" and Oil Processors Federation  
 Federación de la Industria Aceitera de la CE

Fédération de l'Industrie de l'Huilerie de la CE  
 Federazione dell'Industria Olearia della CE  
 Federatie van de Olie-industrie in de EG  
 Federação da Indústria de Óleos Vegetais da CE

Rue de la Loi 74 - Bte 4 - 1040 Bruxelles Tél. (02) 230 31 25 Telex: Ofma 23828 Teletex: (02) 230 22 74

Rijswijk, July 31, 1992  
 (The Netherlands)

Mr. G. Wollam

Federal Grain Inspection service  
 United States Department of Agriculture  
 Room 0619-S  
 P.O. Box 96454  
 Washington, D.C. 20090-6454  
 U.S.A.

Faxnumber 202 720 4628

Dear Mr. Wollam,

Our Federation, representing the seed crushing and oil processing industry in the European Community, likes to comment to the proposal in the Federal Register vol. 57 no. 138 of July 17 on the Certification of Additive-Treated Grain.

Our soya bean crushing members are major buyers of U.S.- soya beans and have a strong interest in the quality conditions of these beans. Unfortunately, the quality of U.S. beans has been deteriorating over the past years, whereas the quality requirements of our customers are increasing.

The practice of spraying water for dust suppression is considered to be an undesired practice, as well for quality reasons, as for "fair trade" reasons, especially where better dust suppression technics are available.

Our members welcome the proposed rule as a first step, but look forward to the next step i.e. the total banning of water for dust suppression.

Yours sincerely,

Dr. C.J.M. Maershoek  
 Executive Director VERNOR  
 (Charged with soya bean quality subjects).

*Handwritten signature*  
*7/30/92*

## JAPAN OILSEED PROCESSORS ASSOCIATION

(NIPPON YUSHI KYOKAI)  
 YUSHI KOGYO KAIKAN BLDG.  
 13-11, 3-CHOME, NISHINBASHI, CHUO-KU  
 TOKYO, JAPAN  
 TEL: 271-2705

July 30, 1992

Mr. George Wollam, FGIS USDA  
 Room 0632 South Building,  
 P.O. Box 96454  
 Washington DC. 20090-6454

Dear Mr. Wollam,

Following is our comment in response to FGIS proposed rules for Certification of Additive-Treated Grain, published in Federal Register Vol. 57, No. 136 Friday, July 17, 1992 under 7 CFR Part 800.

JOPA, Japan Oilseed Processors Association, representing 30 oilseeds crushing and refining companies in Japan, would like to express our deep appreciation for FGIS's quick and fair decision to oblige the statement in the certificate that a dust suppressant has been used.

We agree with the proposed regulation.

- By applying this rule, we expect that the problem of extraordinary much increase of FM content between loading analysis and unloading analysis, which occur quite frequently this year for imported U.S. soybeans and we doubted that the cause of the phenomena might have some concern with addition of water which was applied for the purpose of dust suppressing, will be under control.
- Moisture has big influences on the quality of soybeans, as well known. Moreover, when added, it does influence the accuracy of FM analysis and accordingly affect the differences of FM contents between loading and unloading analysis, which we usually call ΔFM, depending upon the site where the moisture was added.

We heartily wish your success in adopting this new proposal.

Sincerely yours,

*M. Kurashige*

Mitsuo Kurashige, Director/Technical  
 Japan Oilseed Processors Association



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 telegraphic Address MIELIERAAD

Rig alle korrespondensie  
 aan die Hoofbestuurder

Address all correspondence  
 to the General Manager

Navres/Enquiries D.E. Cronje	Bylyn/En 2313	Verwysing/Reference 23/211/3/5 27 July 1992
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C 1620

FAX NO. 091-302-720-4628

ATTENTION: MR GEORGE WOLAM

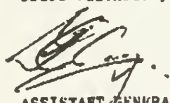
FGIS  
 USDA  
 P O Box 96454  
 WASHINGTON DC 20090-6454  
 USA

Sir

**COMMENTS ON PROPOSED RULE 7 CFR PART 800 - CERTIFICATION OF ADDITIVE-TREATED CORN**

Corn is used for the manufacturing of human staple food in Africa (similar to corn grits). Therefore only the best available quality of corn is imported to South Africa. Amongst the various steps which were taken to ensure that imported corn conforms to the quality requirements of the South African consumer, is the exclusion of three export ports in the USA, which might make use of water addition to export corn in order to control dust. Without going into the reasons for this arrangement (we agree with the discussion in the supplementary information to the proposed rule), we believe that the proposed rule is to the benefit of both the exporting country and the importing country. Therefore we support the proposed rule, but we are strongly in favour of an ultimate prohibition on adding water to grain.

Yours faithfully



ASSISTANT GENERAL MANAGER (TECHNICAL)

DIE ONMSKARE SKAKHLE VIR STRATEGIESE BEGRYWE

THE VITAL LINK FOR STRATEGIC INDUSTRIES

p22/arg

Mr. VOLKMER. Mr. Chairman.

Mr. JOHNSON. If the gentleman can keep it brief.

Mr. VOLKMER. Very brief.

I have just been reviewing a letter dated October 5, 1993, to the chairman, from a B.J. Walker of Walker & Associates. Have you seen that letter?

Mr. SHIPMAN. Yes, we have.

Mr. VOLKMER. Could you send a written answer to this letter to my office?

Mr. SHIPMAN. Certainly.

[The letter follows:]


**Walker & Associates**

Telephone: (417) 742-3303  
 Fax: (417) 742-3959

Route 6, Box 591A • Springfield, Missouri 65803-9535

Fire Protection Engineers  
 Risk Control Consultants

October 5, 1993

The Honorable Tim Johnson  
 Chairman  
 Committee on Agriculture, Subcommittee on General Farm Commodities  
 United States House of Representatives  
 Room 1301, Longworth House Office Building  
 Washington, DC 20515

Subject: Subcommittee Hearing on the Use of Water to Control Grain Dust

Dear Mr. Chairman:

Since I was invited to present testimony to Senator Daschle's Senate Subcommittee on Agricultural Research, Conservation, Forestry and General Legislation, it was thought appropriate that such testimony should also be provided to your committee.

Walker & Associates is a professional consulting group specializing in identifying, analyzing, and cost-efficiency solving problems in property risk control, fire life-safety, fire protection systems review, general and public liability risk control, and occupational safety and health. We visualize these areas as encompassing all aspects of the protection of assets-human, financial, and material-from loss. I have been involved in the loss control aspects of the grain industry for thirty-two years.

My comments will be limited to fire and explosion implications and employee health aspects of a legislative ban on the legitimate practice of using water for dust suppression.

FGIS has taken the position that there are alternative dust control methods available and in use throughout the industry. One of these alternatives, pneumatic systems, although installed in export, terminal and the larger country elevators, are either not provided or are substandard and ineffective in hundreds (possibly thousands) of the smaller country elevators.

Water-based dust suppression systems are installed in facilities having pneumatic systems (as FGIS indicates in their reasoning for the abolition of water), but our experience in surveying grain elevators for property insurance purposes reflects that the water systems were installed in the majority of cases because the pneumatic systems have a long history of generally unsatisfactory performance and are expensive to operate and maintain.

*Walker & Associates*

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The FGIS proposed rule states "prohibiting water as a dust control method will not increase the risk of elevator explosions nor have a significant economic impact on elevators that currently use water". We take exception to this statement. Water is considerably more effective in the bucket elevator leg, the number one cause of explosions.

OSHA, National Fire Protection Association, and others have requirements that include limiting fugitive dust layers to 1/8" deep in priority housekeeping areas of grain elevators. We rarely find a pneumatic dust collection system that can maintain this level of housekeeping, even though a depth of only 1/64" can support a secondary explosion. It is the secondary explosions that usually result in the loss of life and extensive property damage. A properly engineered water system can maintain less than the maximum 1/8" depth, with minimal manual housekeeping.

Oil additives, while basically an acceptable alternative to water, their use causes more operational problems due to build-up on equipment, and the cost can be prohibitive to small country elevators. Tests have shown that the oil will not mix with the grain as readily as water at the point just ahead of the elevator receiving leg where dust suppression is most needed.

In addition to the fire and explosion considerations, a legislative ban on water addition will subject employees of hundreds (possibly thousands) of elevators to both pulmonary and non-pulmonary disorders as has been documented by National Institute for Occupational Safety and Health (NIOSH). Such will occur at country elevators that cannot afford the initial expense of an aspiration system, and neither the operational costs of an aspiration or oil additive system. We believe that many will be forced to close elevators.

FGIS seems to be ignoring the support from researchers, scientists, insurance companies, grain facility owners, consultants, FDA, OSHA, and others that resulted in the approval of water as a dust suppressant in March 1987.

We believe the current favorable loss experience has caused many to lose focus on the tremendous explosions that occurred in the 1970's and 1980's. We contribute the recent favorable experience to OSHA's housekeeping requirements to a large degree, a requirement to limit dust accumulations which has been met in many elevators through the use of water dust suppression systems.

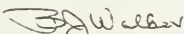
*Walker & Associates*

Page 3

The National Fire Protection Association Committee on Agricultural Dusts, of which I am a member, has just updated the Standards that regulate agricultural and starch dusts and as part of that revision the new Standard will permit the use of water dust control systems.

We respectfully encourage you and your subcommittee to study this technical subject before you as carefully as any you have ever deliberated, and not legislate to abolish the use of water dust suppression systems for grain handling work places.

Respectfully Submitted,

A handwritten signature in dark ink, appearing to read "B. J. Walker". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

B. J. Walker, P.E.  
President



Mr. JOHNSON. Thank you to the panel. You made a very positive contribution to a difficult and important debate.

We will have the second panel now come forward. That consists of Mr. Joseph P. Botos, vice president, administrative division, Cargill, Minneapolis; Mr. David Lyons, vice president, government relations, logistics and operations, Louis Dreyfus Corporation, Connecticut; Mr. Steven McCoy, president, North American Export Grain Association, Washington, DC; Dr. Lowell D. Hill, professor, agricultural economics, University of Illinois, Urbana, Illinois; Dr. Calvin Parnell, professor, agricultural engineering, Texas A&M University, College Station, Texas; and Dr. Robert Schoeff, professor emeritus, department of grain science and industry, Kansas State University, Manhattan, Kansas.

Because we have an expert panel, a large panel, and another panel to come, the Chair will enforce a 3-minute rule on the discussion and questions. I appreciate that that is a demanding time constraint. However, all of the written statements are received for the record in their entirety. The subcommittee and its staff will be reviewing those very closely. And in order to be sure that we conclude this hearing in a timely fashion, we will enforce a 3-minute rule both on the part of the panelists and on the part of the subcommittee members.

So with that, again, your statement is received in the record in full, and you may summarize however you wish. Thank you to the members of this panel. Let's proceed then with Mr. Botos.

**STATEMENT OF JOSEPH P. BOTOS, VICE PRESIDENT,  
ADMINISTRATIVE DIVISION, CARGILL, INC.**

Mr. BOTOS. Thank you, Mr. Chairman and members of the subcommittee.

I am Joe Botos. I am a vice president of Cargill, Incorporated, and I manage the company's environment, health, and safety department. In that capacity I oversee Cargill's environmental, health and safety policies, procedures and practices, at our more than 800 facilities worldwide and for the 67,000 employees of Cargill. Cargill's businesses include grain handling and export; wheat, corn, and soybean processing; barley malting and animal feeds.

Cargill fully supports the mission and reauthorization of the Federal Grain Inspection Service. We favor the adoption of the proposed rule banning water-add that the Federal Grain Inspection Service has published for comment. That rule reflects the prevailing consensus and practice in the grain industry. It is the rare exception when grain handlers are applying water to grain, but even then it should be banned.

Cargill opposes the addition of water to grain because: Adding water harms grain quality and makes customers less satisfied with the product; adding water is not prudent elevator management practice for minimizing risks of grain dust explosions and it could divert attention from methods that truly do contribute to elevator safety; and attempting to regulate adding water to grain would undermine the integrity of the U.S. grain handling system.

In the interests of time, I am submitting a paper, as an attachment to my prepared statement, entitled "Water-Add in Grain,"

which provides a detailed explanation of my presentation today. I ask that it be made a part of the hearing record.

In addition, I have three letters here from three industry associations, the National Grain and Feed Association, the North American Export Grain Association, and the Grain Elevator & Processing Society, that I also ask be made part of the record.

The Grain Elevator & Processing Society is an industry association made up of 3,000 operations members that deal with the safety issues in the grain elevators in this country.

Mr. JOHNSON. Thank you, Mr. Botos.

Mr. Lyons.

Mr. BOTOS. Excuse me. I am asking to submit some papers for the record.

Mr. JOHNSON. Those are received for the record.

You may proceed with testimony.

Mr. LYONS. Thanks very much for inviting me to come today.

Mr. JOHNSON. I think we got a little bit out of order here. Mr. Botos needs to conclude his testimony.

Mr. LYONS. I am sorry, Joe.

Mr. BOTOS. These folks are all anxious to tell you what they have to say about the situation.

Let me say from the outset that I don't envy the task of the committee. You will hear emotional arguments and see many contradictions in these presentations here today. Those of us in the grain industry have heard most of them before.

That is why the vast majority of those in the grain business oppose adding water to grain. We do not want to be forced by competitive pressures to do something we know will hurt the quality of our product and the integrity of our industry. Make no mistake about it. That is exactly what will occur if the U.S. Government attempts to regulate the addition of water to grain.

Adding water to grain is detrimental to grain quality and storability, and according to a 1982 study that looked at additives to suppress grain dust, that fact occurs. That study found that added water tended to collect in the dust portion of the grain stream. This concentration of the added water creates the conditions that promote mold growth and insect infestation, and that limits grain storability and creates unnecessary quality risks.

In addition, it opens the door to a huge ethics question. The buyer doesn't get what he paid for and he always wonders what he is getting. The buyer must get what he pays for.

I learned a lesson in this regard in my first summer job in a country elevator in Iowa. My job was to work the driveway. One day a farmer named Wilmar Peterson was delivering soybeans to that plant. What I discovered after Wilmar had delivered three loads of grain was that he had a system. He carefully positioned himself on the platform when the grain was loaded and off the platform scale. Wilmar weighed 300 pounds. At the end of the day, I had bought Wilmar three times, and the elevator was short 900 pounds of soybeans. The buyer has to get what he pays for.

No doubt you will hear claims that water is a low-cost option for dealing with dust. Let's consider the true cost in that equation. Even if applications are only at three-tenths of 1 percent for corn, the effect of adding water is to create three-fourths of 1 cent on

each bushel. On the 6 billion bushels of corn that move off farm annually, that is potentially \$45 million rolled into the price. The price for adding water to soybeans at similar rates would be slightly more than 2 cents per bushel or \$40 million a year. For wheat, the price effect could be \$20 million a year.

That additional price needs to be considered in the cold light of day. First, it would be charging grain prices for water. But for that additional \$100 million, not one additional pound of flour would be milled, nor an ounce more of soybean oil produced, nor an additional drop of corn sweetener or ethanol would be produced. And, the quality of those products, in fact, might be compromised by the practice.

Mr. Branstool earlier related a story about the cattle feeder occurrence. I won't go into that. Proponents of water-add claim its safety benefits outweigh its quality risks. We disagree. Sound facility safety management is built around prevention, not partial fixes. Prevention means careful layout and design of plant and equipment, including: Moderating speed of equipment; enclosing equipment; utilizing controlled venting; pressurization of equipment; and avoiding long free-falls, sharp angles, and steep inclines in the grain-handling process. Design and layout should be supplemented with aspiration and air-cleaning equipment at critical points in the process.

We also need proper preventive maintenance and housekeeping practices and the installation of heat-sensing and motion detection equipment in the operation.

Water-add is not a substitute for these other measures and is at the bottom of any sound safety checklist. In fact, the application of water to grain has a negative effect on safety because it can leave a residue of a mud-like substance on grain handling equipment. It creates or has the potential to create an unsafe condition.

Use of liquid additives has a value in reducing fugitive dust emissions to the surrounding environment. But food grade mineral oil is more effective than water-add in its initial application and it does not require repetitive applications, does not create grain quality risks, and is self-regulating. These benefits are largely environmental and should not be confused with the essentials of safe elevator management.

We believe that the Federal Government cannot regulate the addition of water to grain. It must ban it. There is no practical way to detect water-add or to provide buyers with assurances of how much water was added in the course of the grain's movement from the farm to the consumer, or when the addition of the water occurred, or whether it was added in a uniform manner.

If the United States chooses to permit any addition of water to grain, addition of water at least up to that level will become the standard throughout the U.S. agricultural system. If it becomes permissible for one, competitive pressures will make it incumbent on all. America's reputation for grain quality and integrity as a supplier will be called into question.

Adding water to grain is potentially harmful to quality; it is vulnerable to abuse; it offers no assurances on safety that are not available through other, better techniques; and its environmental benefits are marginal and attainable in other, better ways.



Since any program that attempts to oversee the addition of water to grain will end up compelling it, the better course is to ban the practice. That is what the Federal Grain Inspection Service has proposed to do. We believe they will do it and we believe they should be given the opportunity to do so.

Thank you.

[The prepared statement of Mr. Botos appears at the conclusion of the hearing.]

Mr. JOHNSON. Thank you, Mr. Botos.

Mr. Lyons, would you proceed next.

**STATEMENT OF DAVID C. LYONS, VICE PRESIDENT, GOVERNMENT RELATIONS, LOGISTICS AND OPERATIONS, LOUIS DREYFUS CORP.**

Mr. LYONS. I will try to be very brief, Mr. Chairman.

This is an issue that is very important in terms of the reputation and image of U.S. grains in the world marketplace, the integrity of the grain marketing system, and I think ultimately our real competitive position in world markets.

I am here today to voice my strong support for a prohibition on the watering of grain for the suppression of dust. Basically we support wholeheartedly the Federal Grain Inspection Service—FGIS—proposed rule. We assume FGIS will go forward and implement the prohibition on watering grain in order to suppress dust.

I think the issue has been wrongly portrayed as one of safety or an issue of containing dust or controlling dust. For every company, including Dreyfus, the control of dust and safety is No. 1. You want to have a risk-free, safe, and healthy place for your employees. You want to control the danger of fire and explosion. You want to be a good neighbor.

Common sense tells us that water must be effective in suppressing dust. But there are many other ways that it can get done. I think the safety record and experience of Dreyfus and a number of other companies indicate it is not necessary to use water for safety reasons.

There are various systems used, and Joe knows much more about that than I do. The one that I would like to comment on is oil. And I hear sometimes that either you use oil or water, and that is not the case. A third of the export elevators don't have any capability of using oil. In the interior, it is probably much less than that. If a flour miller doesn't want wheat treated with oil, the wheat is sourced from an elevator that doesn't use water. It is not a real practical business consideration.

If it is not necessary for safety, then why are people doing it? It is pure and simple, watering is done to add weight. The position of Dreyfus has always been if it wasn't clearly illegal, it was at least unethical.

The incentives are tremendous here, and Joe talked about them a little bit. If you add one-half of 1 percent to a \$6 bushel of beans, it is 3 cents a bushel. Over \$1 a ton, over \$50,000 on a 50,000-ton cargo. There are tremendous opportunities to abuse this.

Can it be regulated? Some people think so, but it is estimated there are over 10,000 country elevator locations in the United States.

Can it be regulated? I don't think so, not unless you can have someone there 24 hours a day, 7 days a week, at every location. Resources just don't seem to allow that.

Let's assume for a minute that it could be regulated, somewhat as the Senate language talks about. What does that really mean? We think that it means that potentially the practice will proliferate throughout the trade. Competitive pressures will drive it that way. The industry will be watering grain from the time it leaves the farm until the time it gets to the end user. Who knows how many times? Three times, six times, a dozen times? Nobody knows.

I have heard up here sometimes that we ought to let the market take care of this. The market will take care of it. The competitive pressures will dictate that it proliferates throughout the industry. I don't think that is the kind of grain marketing system we want in this country.

Let me conclude real quickly. U.S. agriculture, farmers, the bulk grain export industry has been through very difficult times. We have not achieved the export levels we had in the early 1980's. We have lost exports. We have lost market share. We can't risk the image of U.S. grains in the world marketplace. We cannot risk the U.S. competitive position in the world market place.

It is a very competitive world marketplace. It would be very short-sighted to do that, in order to allow the watering of grain.

And finally, just the last point here, the House needs to reject the Senate language. That opens the door up to a permitting process, a regulating process. The Congress needs to step back from this thing and let the regulatory process work its will here. That is how this thing should be handled.

Thanks very much for your time.

[The prepared statement of Mr. Lyons appears at the conclusion of the hearing.]

Mr. JOHNSON. Thank you, Mr. Lyons.

Next is Mr. McCoy.

#### STATEMENT OF STEVEN A. McCOY, PRESIDENT, NORTH AMERICAN EXPORT GRAIN ASSOCIATION

Mr. McCOY. Thank you, Mr. Chairman.

I am Steve McCoy, president of the North American Export Grain Association, which is the national association of U.S. grain and oilseeds exporting companies and cooperatives. I have a brief statement today I would like to make.

First, I want to assure the members of this subcommittee that all of the companies and cooperatives that comprise NAEGA share a determination to ensure the safe operation of the facilities they own and operate. Safety is a paramount concern of the entire U.S. export grain industry. And you have had the opportunity this morning to talk to experts in this area, so I am not going to dwell on the issue. I would like to touch on some of the other central aspects that are associated with this debate.

NAEGA supports the Federal Grain Inspection Service proposed rule that would prohibit the addition of water to grain for purposes other than milling, malting, or similar processing operations, and other currently approved Food and Drug Administration uses. We do so because we are concerned that no regulatory framework ex-



ists that provides a full and necessary assurance that the practice of water addition to grain, for purposes other than those allowed by FGIS under the proposed rule, would not, in the future, be subject to some form of abuse.

Abuse of such a regulatory system would undercut perceptions regarding the quality of U.S. grain and the integrity of the U.S. grain marketing system, and, thereby, harm the competitiveness of the U.S. grain and international commerce.

The matter of water addition is, as you know, currently before the FGIS. NAEGA believes the rulemaking process currently underway provides the best and fullest opportunity for all views in this matter to be properly weighed and adjudged.

We support the House approach in this matter, which is silent on the addition of water to grain, and urge you not to recede to the Senate provision of S. 1490 that would allow the application of water for dust suppression under certain specified conditions.

We will be making our views known to FGIS and we encourage others to do so.

Mr. Chairman, that concludes my remarks. I would be happy to answer any questions you might have.

[The prepared statement of Mr. McCoy appears at the conclusion of the hearing.]

Mr. JOHNSON. Thank you, Mr. McCoy.

Next is Dr. Hill.

**STATEMENT OF LOWELL D. HILL, L.J. NORTON PROFESSOR,  
DEPARTMENT OF AGRICULTURAL ECONOMICS, UNIVERSITY  
OF ILLINOIS, URBANA-CHAMPAIGN**

Mr. HILL. Thank you.

The problem of rewetting grain is not of recent origin. It goes back to the early 1700's where French merchandisers were accused of adding water to wheat to freshen its quality, which sounds to me like a euphemism for dust control.

I will skip all the examples in between except one more, 1925, when the USDA informed the industry that adding water was unethical and was declared illegal adulteration. Note the date of 1925. FDA focused on motive and ruled that the intentional addition of water to grain to increase its weight was considered to be adulteration. Note that the addition of water regardless of purpose would increase its bulk and weight. If the question is one of increasing the weight, it doesn't matter what your purpose is. You are in fact violating the Food and Drug Administration ruling.

Following an abortive effort to prosecute a Michigan farmer for adding water to grain before delivering it to the elevator, the FDA resigned itself to prosecuting only flagrant violations. Motive is extremely difficult to prove, especially when the end result is the same regardless of the motive.

There are several reasons for wetting grain, which we have already talked about. I will skip over most. One is the idea of suppressing dust, but it does not remove it. We do not improve the quality at all by adding water to suppress the dust. It only passes the problem to the next stage of the market.

The main criterion, of course, is if adding water increases the weight of the grain. The addition of water to grain can generate ad-

ditional income only if the moisture content of that grain is below the moisture content set by the market for the base price. If the price per pound is the same for 14 percent moisture corn as for 15 percent moisture corn, the seller has a strong incentive to add water. The seller receives the price of corn for water up to the moisture level specified by the market.

Moisture above the base level is considered by grain buyers to determine quantity, not quality, so they use shrink factors to adjust that quantity back down to its equivalent bushels at base moisture.

However, penalty for moisture below the base is larger than the penalty for moisture above the base. Corn brought to the market at 13 percent moisture receives a hidden discount of about 5.5 cents per bushel because the total weight has been reduced. There is almost no penalty for delivering wet corn because the shrink factor simply reduces weight by the amount of water which cannot be sold for the price of corn. The drying charge for corn at 17 percent moisture ranges from 3 to 5 cents per bushel. This is just the cost of drying and is not a penalty.

We have identified the problems associated with rewetting. Foreign buyers' perception is certainly one of those. Although perceptions are important. The foreign buyers have also ulterior motives in their concern over rewetting. They often receive windfall profits by contracting for 14 percent moisture soybeans and receiving 12 percent at the destination. The efforts by exporters to deliver 14 percent moisture according to the contract are not appreciated by the importer, whether the higher moisture levels are achieved through blending or through rewetting.

Let me talk briefly about alternative solutions that have been proposed. One of these, of course, is regulation and prohibitions.

Current technology does not enable inspectors to differentiate between grain that has been rewetted and grain that has been naturally dried to the same moisture content. Regulatory prohibitions will be extremely difficult to enforce because this focuses on the process, not on the product.

It is not illegal to store, sell, or transport high-moisture grain regardless of how much damage that might cause in the process. It is only illegal to use certain methods to achieve that moisture content.

There are many methods of adding moisture to grain—by blending, by aerating, by failure to use proper drying, even by selecting the time of day at which you decide to harvest the soybeans, and of course by using some kind of watering device. In general, it is impossible to detect which method was used.

FGIS and FDA are being asked to regulate motive and to prove intent. Any enforcement must rely on motives of the firm.

Changes in moisture content, up as well as down, are a natural process occurring in nature. Grain absorbs moisture from the air during harvest, during aeration, and even during transfer from barges to the ocean vessels. Water is added prior to and during the processing itself. We even use steam to increase the moisture content of soybean meal.

I submit that a prohibition against changing the moisture content of grain is completely unenforceable. While I oppose the addi-

tion of water to grain, I also oppose attempts to legislate this through prohibitions and administrative operations.

There is a better solution. And perhaps the best one is to remove the incentives. The primary incentive for adding water to grain is the result of the current method of pricing grain. Since grain below the base moisture receives the same price per pound as grain at the base moisture, water added to grain has a value equal to the grain. That is a pretty high price to pay for water.

We currently use a shrink formula to adjust the quantity of wet grain. A few elevators are willing to apply that same formula to grain delivered at a moisture content below the base and calculate the equivalent bushels remaining. Let's look quickly at the equivalent bushel concept. The incentive for rewetting is removed if the weight of grain for commercial transactions is determined by the dry matter it contains. The scale weight should be adjusted to the equivalent weight of bushels at a base moisture, a procedure which is now being used by the grain industry for wet grain.

The use of the equivalent bushel concept would solve two problems at once. First, the addition of water would virtually disappear. There would no longer be any incentive to add water.

Second, the motive and intent criteria imposed by FDA would no longer exist. It would be impossible to increase the value of your grain by adding water because the addition of water to grain simply would not increase its value. Grain priced on the basis of the quantity of dry matter it contains would have the same value no matter how much or how little moisture it contains.

The advantages of the equivalent bushel are:

One, it removes the incentive for adding water to grain to increase its weight;

Two, it separates the determination of quantity from the determination of quality;

Three, it allows producers and marketing firms to select the optimum moisture content for managing storage, handling, and quality without being penalized on quantity. At the present time the farmer delivering dry grain gets a much larger penalty than the farmer delivering wet grain;

Four, it eliminates the inequity among sellers, requiring payment for wet or dry grain according to its value;

And five, it provides a more uniform basis for export trade. Foreign buyers would be required to pay for the extra dry matter they receive.

Briefly, these are my recommendations:

One, require that all certificates showing official weights also show the equivalent bushels adjusted to the base moisture;

Two, encourage the entire grain industry to start purchasing grain on the basis of weights adjusted to equivalent bushels. The last survey I did 14 percent of the elevators in Illinois were in fact doing that in one form or another;

Three, rescind the FGIS and FDA exemption that allowed adding water for dust control in the first place. Before that exemption, I believe, 1987, it was already considered illegal adulteration under FDA regulations;

Four, retain the FDA's statement that adding water for the purposes of increasing weight is adulteration. While this remains un-



enforceable except for flagrant violations, if we adjust the quantity to the equivalent bushels, we would eliminate the incentives and enforcement would no longer be a problem;

And five, I would suggest we issue a set of tables as part of the official grain standards that specify the weight of dry matter required to equal an equivalent bushel of each of the grains at the various moisture levels.

Thank you. I do have some attachments to my preposed statement that back up some of the research on these recommendations if you would like to include those in the record.

Mr. JOHNSON. Those attachments and your prepared statement, without objection, are received for the record for this subcommittee.

[The prepared statement of Mr. Hill appears at the conclusion of the hearing.]

Mr. JOHNSON. Thank you.

We turn next to Dr. Parnell.

#### STATEMENT OF CALVIN B. PARNELL, JR., PROFESSOR, DEPARTMENT OF AGRICULTURAL ENGINEERING, TEXAS A&M UNIVERSITY

Mr. PARNELL. Mr. Chairman, I am a professor at A&M agriculture and engineering. I am the person who has done research on grain dust explosions. My testimony is in the record.

I also have the experience of serving for 3½ years on the Texas Air Control Board, so I have sat over there in the kind of position you are at a lower level, where I have had people come in and testify, and I prefer they not read it to me, so I will not read my testimony.

I oppose a ban, and I am a minority at this table. Specifically, I am going to talk about grain dust explosions and the prevention of them, and take a few minutes to try to get you familiar with the terms.

To have a dust explosion you must have four ingredients. One of them is oxygen, always present. One of them is containment. One of them is ignition source. And the fourth, which is many times misunderstood, is dust in suspension in the air at or above the minimum explosive concentration.

It is generally accepted that the minimum explosive concentration is 50 grams per meter. That means if your dust concentration at that point is below 50 grams per meter, even if you have an ignition source you will not have an explosion. That is why the industry wants to lower that concentration.

One method that most export facilities use is pneumatic dust control. Pneumatic dust control is misconceived by the public. They perceive that it removes the dust from grain, therefore eliminating the problem. It doesn't. It is like a vacuum cleaner. It pulls approximately 5 percent of the dust out of the air that is in the grain. Five percent. There is still dust in the grain. And what it does is lower the concentration. It lowers the number of MEC's.

Now there is an alternative to that, adding mineral oil. You are limited by FDA to about 1½ gallons per 1,000 bushels. When you put that on, it covers the surface of the grain with a coating of oil, and the fine dust attaches to that coating. When you go to the

transfer point, where you might have an MEC, dust gets entrained in the air.

Now, most recently I have been out to an elevator where they are using water. I have never seen one before until last week. I went to Nebraska and observed it. I took some pictures. I didn't know whether the pictures would turn out.

What I want to do now is ask the subcommittee to turn to my testimony on the back pages. You should have some color pictures that did turn out, and it shows you the impact of adding water to grain in certain areas. I want to describe that to you.

In figure 1, we are on a gallery here where we have soybeans. Without the water application you have figure 1, a picture there. It is hazy, and you can see dust in the air. It is hard to tell. That is dust in the air.

Look at figure 2 and see how clear that is after the water application rate is added. The water is added to suppress the dust.

If you go to figure 3, you are looking at nozzles. One of your subcommittee members was asking about that. I did observe that. Figure 3 is an air pollution problem, not a safety problem, the load out area. They had a dust cloud above the railcars. Figure 4 shows nozzles used to suppress that dust. It was effective.

On figure 5, they were running the empty conveyor in the basement. I took a picture looking down the basement. You can see kind of a hazy environment in that basement.

And in figure 6 it shows the nozzle. There are several of them in that basement that were turned on. They ran for approximately 5 minutes. These nozzles put out about one-tenth of 1 gallon per minute of supposedly 10 micron particles, according to the vendor.

In figure 7 you can see the dust in the basement as a consequence. It looks like dust but that is a water fog. Two minutes after they turned the fogging nozzles off, the belts are still running. It works in those areas.

Now, ideally I would like to take a picture for you at the grain transfer point showing the application of water and showing how it suppressed dust at those transfer points, but you can't do it. You can't do it at the boot or the head of the leg.

What this elevator was using was a total of 20 gallons, no more, multiple application points, 20 gallons of water per 1,000 bushels. How much is that? Four and a half ounces per 100 pounds. If we are talking about 0.3 percent, we are talking about less than 8 ounces of water in 100 pounds.

I had a 100-pound sack of grain downstairs. I have a feeling most of you know what that is. You take a cup of water, it is my contention it would not manipulate the system. I can't vouch for the people who abuse the system, but I am concerned with the 7,000 country elevators. Pneumatic dust control could cost as much as \$250,000 per application point. Export facilities can afford that but country elevators can't do that.

We have to do the right thing for country elevators that will provide safer working environments and find them ways to comply with air pollution regulations that they are going to be hit with in the next 2 or 3 years.

Thank you.



[The prepared statement of Mr. Parnell appears at the conclusion of the hearing.]

Mr. JOHNSON. Thank you.

We turn to Dr. Schoeff.

**STATEMENT OF ROBERT W. SCHOEFF, PROFESSOR EMERITUS,  
DEPARTMENT OF GRAIN SCIENCE AND INDUSTRY, KANSAS  
STATE UNIVERSITY**

Mr. SCHOEFF. Thank you, Mr. Chairman, for the opportunity to address the subcommittee on this safety matter.

Dr. Parnell covered some of my points, so I will try to skip through quickly.

I produced the film, "Deadly Dust II," as my contribution to industry safety. I understand it has been viewed by many of the subcommittee members and staff. More than 900 copies of this film have been distributed to 328 firms located in 37 States and 37 foreign countries.

I have personally visited 31 grain dust explosion sites since 1976. This includes most of the major ones, Good Pasture, Houston; Continental Grain, New Orleans; Farmers Export, Galveston; and Agri Industries, Council Bluffs. One doesn't feel like having lunch after viewing the terrible physical destruction that we see and the pain and suffering on the faces of those loved ones waiting to find lost persons.

I have had 40 years of experience in the grain industry. The focus of my career has been to educate management on the commitment they must make to protect their most important asset that they tell me is their employees. The physical facilities, raw materials, and finished products are important too, but should not have priority over people.

It is the responsibility of management to provide a safe and healthful place to work. We now have laws and regulations to ensure management of firms do meet these certain safety standards.

A series of major dust explosions in the United States in December 1977, as has been pointed out, caused many fatalities and captured the attention of the news media, Government, and others. The public, and most grain personnel, were shocked that grain could be so explosive, that so many fatalities, injuries, and physical devastation can occur.

Included in my report is the number of grain dust explosions between the period 1983 to 1992. There have been 27 fatalities and 132 injuries during this past 10-year period. Leading States now are Illinois, Iowa, and Nebraska, followed by Kansas, Minnesota, and Texas. Representatives from all these States serve on this subcommittee, and I know you share my concern for the safety of the grain elevators in your State, as I have heard it expressed here this morning.

I would emphasize grain dust is not dirt. There is grave misunderstanding about what it is. It is fine particles, organic material, created in the harvesting, transporting, and processing. Grain dust can be very explosive. For it to occur you have certain conditions to meet. Dr. Parnell has just mentioned those and I will skip on.

We find that the primary explosion usually occurs in conveying equipment, followed by processing equipment, storage bins, or dust collectors. The vertical bucket elevator is the most frequent place because the high concentrations of grain dust suspended in the air when the leg is operated.

The primary explosion will, in most cases, rupture the leg housing or container, and then it is a concussion and release of pressure that shakes a building along with the release pressure wave that causes dust on beams, overhead pipes, and so forth to become suspended.

The flame front becomes a much larger ignition source to cause the secondary explosions. Typically it is the secondary explosion that causes the most damage. And we have documented that as many as 12 explosions occur in less than 2 minutes. They occur in only milliseconds. We find research showing that the turbulence and so forth is causing higher pressures than were originally reported in U.S. Bureau of Mines data.

Mr. Chairman, grain dust explosions are still a serious problem for the grain handling community. Preventing them has been a primary focus of my work. I would like grain elevators to have access to all the tools of technology, including liquid additives such as oil and water which can control grain dust and prevent ignitions.

I would ask the subcommittee members to consider what is the value of a life.

I would be happy to respond to any questions that you might have on the causes of these explosions.

[The prepared statement of Mr. Schoeff appears at the conclusion of the hearing.]

Mr. JOHNSON. Thank you, Dr. Schoeff.

I would ask members of the panel, particularly those who favor the ban on water, the argument has been made that the bottom line is what will the buyer accept, and there is an argument made that we ought to simply allow market forces to dictate how dust is suppressed, and that if buyers refuse grain where water has been used, that should be enough, and that it will not be an incentive for grain companies to use water, because buyers will increasingly reject grain where water has been abused.

How would you respond to that, that we really don't need the FGIS involved in this, that we will let the market rule? Mr. Lyons? Mr. McCoy? Mr. Botos?

Mr. LYONS. I would like to think we don't have to wait until we get complaints from foreign buyers before realizing there is a potential problem here. Once a foreign buyer gets a bad cargo, it is a bad cargo. He may not buy U.S. again for a while. So it is a very serious problem.

Mr. JOHNSON. We have already had some complaints from foreign buyers. And your fear then is that that undermines buyers' confidence in all American grain dealers, not simply in that particular dealer?

Mr. LYONS. Yes. In other words, especially if you would go to repeated applications, then I think the danger of quality problems become even much greater. And I would even venture to say that if this would proliferate in the industry in several years, we will be

back here at a hearing, and we will be asking the big grain companies, Why do we have these problems?

Mr. JOHNSON. Mr. McCoy, your members, who represent all the major export companies, have just had a vote on this issue. I wonder if you could share with us the outcome of that and the concerns expressed by your membership.

Mr. MCCOY. The board of directors of the association met yesterday in a special meeting to determine policy on this issue, particularly or especially for presentation at this hearing today. And the policy is represented in the statement we made to you today.

The overwhelming majority of the members of the board favored a ban on the addition of water and supported the Federal Grain Inspection Service proposed rule on that, and also the other matters that are indicated in the statement. So it is the representation of—it is the policy of our association which represents the overwhelming opinion of the board of directors.

Mr. JOHNSON. To Dr. Parnell and Dr. Schoeff, since the 1970's and 1980's, the number of dust explosions has decreased significantly. However, according to the FGIS, the number of companies using water to suppress dust continues to be very small.

Does that indicate to you that there are other viable ways to suppress dust and minimize explosions, or do you think adding water needs to be one of the options, given the decrease we have had?

Mr. PARNELL. Mr. Chairman, further utilizing water for suppression, I think most of the people are opposed to this. I think adding water—there really are only three ways, in my view, you can prevent a dust explosion which occurs at a grain transfer point. That is pneumatic dust control which is expensive, \$5 or \$10 per c.f.m. It could amount to a \$100,000 to \$300,000 per application point. Pulling dust off, lowering the concentration.

The second way is water application and the third way is mineral oil. There are not multiple options. There are only three. If you take away the option of adding water, basically you are taking away one technical option that may be very feasible. In fact, very few are using it at the present time. I agree with FGIS. As this becomes more viable, I believe more people will use water at country elevators for suppression and safer work environments in those elevators.

I do not think that regulatory action and rulemaking should be left to FGIS. I believe OSHA and EPA and perhaps FDA should be involved in that rulemaking to be sure it is proper. I think the rulemaking should be done by the regulatory agencies, not by the Congress.

When the Congress does rulemaking, it usually cannot take into account all the technical aspects associated with that rulemaking process. Let the agency do the rulemaking. Let the input come from individuals around the table to get a proper rule.

Mr. JOHNSON. Mr. Minge.

Mr. MINGE. I listened with interest to the testimony which was conflicting; and I would like to ask Mr. Botos, you heard the comments from Dr. Parnell regarding the difficulty of installing some sort of dust-suppression system in the hundreds of country elevators to deal with the risks of explosion.



You testified that at Cargill, you feel using water in this process is inadvisable; Dr. Parnell feels it is advisable. Could you tell us, can Cargill control the dust at its rural elevators on an economical basis without using water?

Mr. BOTOS. Yes, we can. We do every day. I disagree with what he just said with regard to the fact that you have only three ways of improving the safety in a plant. I think he listed oil, water, and aspiration as the three methods. There are all kinds of design techniques that can be used. Design the equipment properly. Install the equipment properly.

Dr. Parnell also testified earlier you need to have at least four effects to have a grain-dust explosion. One of those was the ignition source. You eliminate the ignition sources from the elevators, you monitor for those kinds of things to eliminate them before they become a problem. Those are all items that can be done. In addition to this, you need preventive maintenance processes and good housekeeping.

Mr. MINGE. How many elevators does Cargill have?

Mr. BOTOS. We operate at least 300 to 400 elevators in the United States and Canada, country elevators as well as export elevators.

Mr. MINGE. How many explosions have you had in the history of Cargill?

Mr. BOTOS. I don't have the exact number but we have had them.

Mr. MINGE. How many in the last 10 years?

Mr. BOTOS. I would estimate two.

Mr. MINGE. Any loss of life?

Mr. BOTOS. No.

Mr. MINGE. Injury?

Mr. BOTOS. Minor injury at one of those events.

Mr. MINGE. Dr. Parnell, I ask you to pose what you think would be the most useful or penetrating question to this gentleman from Cargill with respect to your positions. We can try to get to the root of the disagreement between the two of you.

Mr. PARNELL. Let me first of all disagree with my colleague to the left, his interpretation of what I am saying. I say when you have a dust explosion, you must have the four ingredients present.

There are ways, he is correct, to prevent dust explosions without using the three methods to reduce the concentration at that transfer point. What I said was if you have a grain transfer point, there are only three ways to lower the concentration at that point so you can prevent that explosion from happening. That is where the grain is coming from one belt to another belt and the grain dust in effect is entrained.

There are only three ways to lower the concentration. That is pneumatic dust control, which is expensive; mineral oil application; and water. Water is the least expensive. That is a fact.

That is what he said I said, not what I said. There are other ways to prevent dust explosions. He is correct.

Mr. MINGE. I would ask you then, Dr. Parnell, Cargill is a company that operates throughout my congressional district. To the dismay of many farmers, they observe that Cargill is financially successful while they are struggling.

I would say that they seem to be doing it without water; and to the best of my knowledge, their elevators are not a loss center in their financial operation. Why is it that Cargill can do what you say it is impossible to do on an economical basis?

Mr. PARNELL. I didn't say that.

Mr. MINGE. You said it is not financially feasible.

Mr. PARNELL. What I am saying is if you use pneumatic dust control at what it costs, it is much more expensive to do it that way than to do it with mineral oil which costs about \$2 a gallon, about 1 gallon per 1,000 bushels. That is less expensive than putting on water which is about half a cent per gallon.

Mr. MINGE. If Cargill, which is a company that is concerned about its bottom line, is willing to do it without water and spend more money on it and still operate in an economical system of grain elevators, including country elevators, not just terminals, why can't other elevators do it?

Mr. PARNELL. I think there are other elevators that can do it. I also think there are other elevators not in as good a condition that Cargill country elevators are. I think they ought to have the option, the technology to do something less expensive than the pneumatic dust-control option.

If we say they are not going to have the option and take the water and take it a step further and ban it as well, then any elevator that cannot afford pneumatic dust control can go out of business. We can take that approach.

There are some out there that do not make a lot of money and may need in my view a means, an economical means to provide safer operating conditions in their facilities. That is my point.

Mr. MINGE. Are these dust control methods other than water subject to patents or other restrictions on availability or increased costs due to the existence of patents that make it hard for elevators that are competitors of, say, Cargill or Bunge to use grain suppression methods other than dust control?

Do we have some sort of economic concentration here of the means of dust control in the hands of larger grain firms that preclude the smaller firms from sharing in that technology?

Mr. PARNELL. No, I don't think so. I think the smaller firms can do just exactly as Cargill did, as Mr. Botos described. They use pneumatic dust control.

The difficulty, you will find in my written testimony, when you look at pneumatic dust control, is that you must use something in the order of 10,000 to 20,000 c.f.m. per bag filter. Then the air pollution is going outside. That system, and you have multiple pick-up points with an elevator, is maintenance intensive.

You have to have a good maintenance program to make sure the systems are operating properly. As you get into country elevators—many small elevators are country elevators—I am not sure they have the ability to maintain the maintenance levels that the exporting main terminals have.

Mr. MINGE. Thank you, Mr. Chairman.

Mr. BOTOS. If I may?

Mr. MINGE. I will defer to the Chair. I notice the light is red.

Mr. JOHNSON. Mr. Botos, why don't you make a concluding statement? Then we will move on.



Mr. BOTOS. I just want to make a clarification. We do not have pneumatic dust control in every one of our grain elevators. We do not use a mineral oil addition in every one of our grain elevators. We use a combination of housekeeping practices, maintenance practices, and design practices, and we supplement it with aspiration where it is needed or with pneumatic dust control where it is needed and in some cases, we use mineral oil.

Mr. JOHNSON. Mr. Pomeroy.

Mr. POMEROY. Dr. Parnell, have you evaluated the cost implications of a growing perception with foreign customers of decreased quality due to water-dust suppression activity?

Mr. PARNELL. No, sir. I would not be the one that you would ask that question. A professor at A&M has an outstanding position in these situations. I am not into the area where I get the perception of the foreign customer.

I might add this one thing. I did put in my written testimony, when you take the moisture content of grain and you take a 10 percent change of relative humidity, you can have a 1 percent change in moisture content of the grain. From an academic point of view, that is twice as much as the total—what I suggest total application of what grain should be allowed to come to the elevator, one-half of 1 percent.

I think it is difficult these days to take where you get water from the environment and you can have a 1 percent change or maybe as much as a 10 percent change in moisture content from environmental conditions, and then turn around and say if you use water application systems for dust suppression at a total application rate that might, in fact, be at 0.5 percent, no higher, discounting any evaporation, that this is going to change the whole marketing system. From a common sense point of view, from an experience point of view, I have difficulty understanding that.

Mr. POMEROY. You mentioned other alternative dust-suppression methods in addition to water. Do these alternatives give rise to similar quality concerns that the application of water has?

Mr. PARNELL. I think Cargill would probably testify to this, too: There is a limited—some concern out there in terms of adding mineral oil to grain for dust suppression, primarily from the wheat industry, milling, also from the barley industry where they make liquor that will be aged for years. They are concerned about the taste. Those markets basically say, Don't put oil on the grain.

There is that kind of marketing incentive not to add oil for dust suppression. I think it would be better to talk to one of these companies, to ask about that.

Mr. POMEROY. Mr. Botos, I would like you to respond to evaluating the alternatives available to a company for dust suppression and their relative impact on grain quality or perceptions of grain quality with foreign customers. Is there anything that compares to water in terms of adversely impacting quality?

Mr. BOTOS. The addition of water to grain will impact the quality of the grain. Adding water will impact the quality of the grain. The foreign buyer, once the perception is there that this is allowed, will not understand that and will seek other alternatives for his supply. We believe that.

Mr. POMEROY. You might say that that is a cost to the system, loss of markets?

Mr. BOTOS. It is a definite cost to the system. Mineral oil addition, I think here today the perception is that perhaps there is a large quantity of this going on. In fact, adding mineral oil to grain is done at less than 10 percent of the same quantity of water; in other words, three-hundredths of 1 percent or 1 gallon to 1,000 bushels of mineral oil will suppress the dust to the point you need it suppressed in the application where you use it.

It is a one-time application in most cases. It can be dealt with in the marketplace. If the buyer does not want grain with mineral oil added to it, he so states.

Mr. POMEROY. Thank you. No further questions.

Mr. JOHNSON. I want to thank—does the gentleman from Minnesota have any additional questions?

Mr. MINGE. Does either Cargill, Bunge, or Dreyfus buy grain from other elevators if you know that dust-suppression methods involve the use of water and have been used in that grain?

Mr. BOTOS. We stipulate in our contracts we do not want grain with water addition.

Mr. MINGE. So if an elevator has used a dust suppression system that has used water, you would not buy that if you know that to be the case?

Mr. BOTOS. We stipulate that in our contract.

Mr. LYONS. In Dreyfus contracts we require that the seller warrant that water has not been added. However, we can't know if before in the marketing chain that a previous owner of the commodity may have added water. We get that warranty from every seller to us.

Mr. MINGE. Do you know of anything, Mr. Lyons, with respect to the availability of dust-suppression systems, are they available on the same basis to country elevators that they are to you, the ones that do not use water? Or is there a patent or some other control on the availability of those systems that limits the availability of a country elevator to acquire those systems?

Mr. LYONS. No limitation that I know of.

Mr. MINGE. Thank you, Mr. Chairman.

Mr. PARNELL. Mr. Chairman, I brought from Texas a couple of bottles of grain, one that has been sieved. This is corn dust. I would like to leave it here rather than take it back on the airplane. If it is all right, I will leave it for any subcommittee member who wants to see what grain dust feels like.

Mr. MINGE. Will it explode?

Mr. JOHNSON. Any more questions?

Mr. POMEROY [assuming chair]. I want to thank this panel for their very instructive input.

At this time, we will proceed to the third and final panel for this morning's hearing: Mr. Allen Richard, legislative representative of the National Farmers Union; Mr. Robert Nooter, director of government relations for the American Farm Bureau; Mr. Keith Mestrich, director of special services for the Food and Allied Service Trades of the AFL-CIO; Mr. Larry Clark, secretary-treasurer, Local 40, International Longshoremen's & Warehousemen's Union, Portland, Oregon.

Thank you for being with us.

**STATEMENT OF ALLEN RICHARD, LEGISLATIVE  
REPRESENTATIVE, NATIONAL FARMERS UNION**

Mr. RICHARD. I am Allen Richard representing the National Farmers Union. We have 250,000 family farm members. It is a pleasure to be here today to testify on this important issue.

Mr. POMEROY. I would like to say it is a particular pleasure for me. I was a legislative colleague of Allen Richard back in the North Dakota State Legislature. He sat in back of me and told me when I was talking too much. You don't have that luxury today. I do have the luxury of telling you if you talk too much. Good to have you here.

Mr. RICHARD. Thank you, Mr. Chairman. It is a double pleasure for me as well. It is a rather uncomfortable position knowing the exchanges that you and I have had in the past.

This situation with grain dust is very important to us. It is also on a personal level important to me because I spent most of my life as a family farmer in North Dakota and grew Durham wheat. I don't think the subcommittee members would like to hear more about Duram wheat than they have in relation to other things recently.

Mr. Chairman, the National Farmers Union strongly supports the Federal Grain Inspection Service proposed ban on the addition of water to grain. We feel that that proposed ban is a giant step forward in promoting grain quality in the United States and the reputation of those who export it.

I would also add at this point I am paraphrasing many of my comments because there are a number of things already brought up. I would like the written comments included into the record.

NFU members meeting at several national conventions reiterated on several occasions their policy position which specifically states in part, "To protect and improve our reputation as exporters of American farm commodities, we support legislation which would prohibit and penalize exporters adding foreign material or moisture to any commodity for overseas shipment. Export customers should pay for shipments on a clean grain basis, just as farmers are paid on a clean grain basis." This can be found in the policy manual of the National Farmers Union.

I am going to paraphrase some of the things because I quoted some of the testimony that Cargill issued at previous hearings on the Senate side with relation to Senate bill S. 1490. We also support the reauthorization of FGIS without the addition of the proposal that they have to allow this.

In all the permit system, we feel a number of questions have to be asked and would be very difficult to answer. First of all: What would be considered an acceptable watering system design? How would the maintenance of the system be monitored? Would FGIS have to inspect the systems and employ people for the purpose of inspecting the systems and reading water meters on a regular basis?

Who would pay for such inspection activities, the taxpayers, or would it be passed on as an additional cost to farmers reflecting prices paid to them?



What could prevent an elevator from running grain through the system repeatedly until it contained the maximum amount of moisture? How would FGIS detect and prove abuse? How would the reputation of American producers be affected by alleged or proven abuses?

NFU acknowledges that grain dust has been, and under certain circumstances continues to be a problem. But it is a problem with several solutions, all of which are more beneficial to American farmers and to America's reputation as a supplier of quality grain than the use of water.

Even the smallest grain elevators in rural areas have other methods. Some of them have installed pneumatic systems in grain elevators like the local one where I live that only had 48,000 bushels of capacity. That elevator was built 50 years ago. It has not had any problems. It has a pneumatic system installed in it.

If this can be done on a local level with small elevators which have storage capacities of under 100,000 bushels, then terminals which have capacities in the millions of bushels and vast financial resources should be able to solve their dust problems without adding water, elevators that have not only vast amounts of high-technology equipment but also considerably more in the way of assets to work with this equipment.

Some of you may have seen pictures of grain elevators that exploded due to accumulations of grain dust and all of the havoc that that can cause. We feel that along with what the gentleman from Cargill has said, much of this can be avoided by improving housekeeping practices.

If there has been this type of explosion in the past, we have noticed they are also declining in number. It is probably increased good housekeeping practices that prevented that.

There has been a reference made to what the Canadians do and how their regulations work. The Canadian Grain Commission has had the following language as part of its regulations dating back to the early 1970's.

"No. 104. No operator of a licensed elevator shall \* \* \* (d) except with the permission of the Commission, mix with any grain in the elevator any material other than grain."

That was put in in 1970, 1971, and 1972, and to this date, no permit has ever been issued by the Canadian Grain Commission to allow anything to be added.

I notice the red light is on, Mr. Chairman. I am going to conclude quite quickly.

The National Farmers Union views the practice of adding moisture to grain as nothing more than a method of stealing from both ends, a method of reducing the quality, the perception of quality that the purchaser has in American grains and in lowering the prices paid to American sellers and also forcing those who buy grain to get something they are not paying for and do not want.

No one in the National Farmers Union is naive enough to believe that this will result in benefits to anyone except the companies that adopt the practice.

Mr. Chairman, adding water to grain has nothing to do with dust, in our mind. It has to do with dollars, fewer dollars for Amer-

ican farmers and more dollars for the companies that want to legalize the practice.

Thank you.

I will answer any questions you may have.

[The prepared statement of Mr. Richard appears at the conclusion of the hearing.]

Mr. JOHNSON. Mr. Nooter.

**STATEMENT OF ROBERT I. NOOTER, DIRECTOR, GOVERNMENT RELATIONS DIVISION, AMERICAN FARM BUREAU FEDERATION, ACCOMPANIED BY DAVE MILLER, COMMODITY POLICY AND PROGRAM SPECIALIST**

Mr. NOOTER. I am Rob Nooter, director of government relations for the American Farm Bureau Federation. I am accompanied by Dave Miller, commodity policy and program specialist for the Farm Bureau.

The Farm Bureau has spent a considerable time developing a position on the use of water as a grain dust suppressant. On the surface, the idea of totally prohibiting the addition of water to grain seems to be one that the farm community could fully endorse from a quality perspective; but we don't think the issue is that simple.

Our policy is clear in expressing our concern for promoting grain quality and protecting farmer and agricultural worker safety. In this case, the need for safe grain handling procedures appears to clash with the quest to maintain U.S. grain supplies of the highest quality.

However, a simple ban on the use of water as a grain dust suppressant could be shortsighted and lead to other grain quality problems.

Our response to these conflicting needs is to call for appropriate regulation, not prohibition. Farm Bureau supports both oil and water-based systems if the systems conform to science-based technology.

We recommend that use of water for dust control should be regulated by FGIS through the imposition of a comprehensive "permit" system. The provisions of S. 1490, as approved by the Senate last week, provide the correct guidance to FGIS on this issue.

Systems eligible for permit status should not be capable of adding more than 0.3 percent water, on a weight basis, should include sealed metering, and monitoring devices, and should be subject to unannounced inspections by regulatory personnel. Any evidence of tampering or malfeasance should be subjected to swift, severe penalties including the permit loss of the permit.

With respect to controlling dust, there are several points in my testimony. I want to highlight a couple. One is that pneumatics alone are generally insufficient to adequately control dust.

Second is that supplemental spray systems—both oil and water based—were developed to respond to the problems of elevator explosions due to dust which have continued but have been on the decline. Nonetheless there has been considerable injury and loss of life in the last few years.

In the Pacific Northwest, air quality regulations, both interior and exterior to the facility, often necessitate the use of supplemental dust control systems.



Water is much cheaper as a dust suppressant than are mineral or vegetable oils; and ultimately the cost of controlling dust is passed back to producers in the form of wider operating margins and lower prices.

And, finally, in some applications, the addition of oil as a dust suppressant can have impacts on the milling and baking characteristics of some wheat.

Several foreign buyers and domestic buyers have expressed deep concern for the expanding practices of using mineral oil and vegetable oil as dust suppressants and some will not buy it.

It is indisputable that oil sprays are very effective at controlling fugitive grain dust; but one of the primary weaknesses of oil sprays is that they also act as an adhesive for the dust mixture in flour components.

Conversely, water sprays are not long-lasting. Much of the water evaporates soon after application. Water does not act as a long-term adhesive gluing dust mixture to the grain. Water application does not adversely affect milling operations or end-use qualities.

We recognize, in some cases, water has been added to grain not for dust suppression but rather to gain an economic advantage by adding weight to overly dry grain. We condemn such action, and support development of appropriate limits and controls. The permit system would do just that.

We would support a requirement that grain which may be subject to dust suppression through the addition of water would be required to be merchandised on a standard bushel or dry-matter adjusted basis, as Dr. Hill spoke of on the earlier panel. We believe this would make the use of water as a dust-control material a moot issue since there would be no economic incentive to add more water than was necessary, than that needed to control the dust.

We believe that this provision could be added to the permit process since the application for the permit is voluntary. Grain handlers who prefer not to merchandise grain on a standard bushel basis would not be mandated to do so; but they may have to incorporate more expensive dust-suppression systems utilizing pneumatics or oil sprays.

The Farm Bureau is firmly committed to finding solutions to circumstances which can lead to detrimental grain quality. Those who abuse the system or use water ineffectively should be stopped; but we are also committed to the development of reasonable and responsible safety regulations promoting safe working conditions; and we believe we should not throw out an effective means of controlling fugitive dust in grain elevators and reducing elevator explosions simply because a few unscrupulous elevator operators have abused the technology.

[The prepared statement of Mr. Nooter appears at the conclusion of the hearing.]

Mr. POMEROY. Prior to moving to the final two witnesses on that panel, I have a 2 o'clock meeting and will be forced to leave. I would like to direct a question to the Farm Bureau representative.

Mr. JOHNSON [resuming chair]. Inasmuch as it hasn't appeared to cause a detrimental precedent with other members of the subcommittee, I will recognize the gentleman from North Dakota.

Mr. POMEROY. First to Mr. Nooter, I find it curious your farm group will be testifying essentially for congressional intervention with the grain inspection people's own regulatory initiatives. As a standing practice, does your organization favor or disfavor congressional initiatives changing the course of regulatory oversight?

Mr. NOOTER. I think it depends upon the circumstances. I think we like to look at FGIS-developed regulations. Our feeling is the language in the Senate bill is worded broadly enough that FGIS can take into account the new developments in the industry, the new technology that has been developed, and develop an appropriate permit system. If they do not do that, I think as has been testified on earlier panels, you remove one element that is available to grain companies and elevators today.

The way I view it, looking at it from the farm perspective, there are a lot of ways farmers can control costs but not every system works for every farmer. We would hate to have the regulatory system eliminate an option that may be useful for some operators.

I think that that is what we see as the case in this water-type system, provided that the permit assures that the quality is maintained and abuses do not occur.

Mr. POMEROY. My own thinking on the interrelationship between congressional action and regulatory oversight is that the regulatory oversight is defined by congressional action only where there really is an egregious overstep of regulatory initiative.

In fact, I am very worried that others in the House of Representatives, without an appreciation or understanding of agricultural issues, might begin imposing agricultural regulations on a number of issues due to misplaced environmental or other concerns and that they might ultimately be very damaging.

So I think the Farm Bureaus' support of some type of congressional intervention is a little troubling from a precedent standpoint. I am thinking it might give some of your members some heartburn.

Mr. NOOTER. I agree with your concerns about additional regulations. The way we view this issue is that the regulatory procedure appears to be ready to take away an option for the industry to utilize different kinds of technology that is scientifically sound, we don't want to see that happen either.

We are caught maybe in a little bit of an unusual situation; but based on the circumstances of this case, we think we don't want to lose these options that are available, if they are scientifically sound and can be utilized in a proper procedure.

Mr. POMEROY. You made an articulate defense of your position. To the National Farmers Union representative, I would ask how you respond to the suggestion that a permit system be allowed as a means of monitoring this water content?

Mr. RICHARD. Mr. Chairman, Congressman Pomeroy, we do not think a permit system is feasible because it would, one, cause all companies to go to a water based or to look seriously at a water-based dust-suppression system for a number of reasons. I think competitive advantage would be something we are in favor of looking at.

We don't think we need to have FGIS doubling its staff with inspectors and going out to areas of the grain trade in the United States to supervise all these things.

I have checked with a number our State offices from North Dakota to Texas. They have done some research in the area of country elevators to find out how many of them are now using water systems in any way, shape, or form. They come back empty. They do not find rural elevators are using those kinds of systems.

One other thing I would like to mention is that we talk about here a situation where high-priced dust-suppression systems would be reflected in lower prices to farmers because it increases the operating costs of the grain trade. I would submit to you that it is a much greater cost to American farmers to have our commodities looked upon with suspicion by those countries that would normally import them and offer us lower prices for them than any costs of any dust-suppression system used in the United States.

Mr. POMEROY. You are already aware of various allegations made by foreign buyers as to the inferior status of U.S. wheat?

Mr. RICHARD. Yes.

Mr. POMEROY. From a quality standpoint?

Mr. RICHARD. Yes.

Mr. POMEROY. As a former North Dakota producer, was that galling to you in light of the product you were delivering to the elevator?

Mr. RICHARD. I think all agricultural producers whether they are members of our organization, members of no organization or any of the above do their utmost to provide the best quality grain they can. They try to provide it in a fashion and in a condition that will store as well as possible; meaning it will be below the allowable maximums for moisture. They want to provide it in any way they can. If they do not, that is going to be reflected in the prices they receive.

Having something we have had control over as farmers for as much as 2 to 3 years, if we had it in storage, having somebody add things to it which can detract from its quality, yes, it is very galling.

Mr. POMEROY. I apologize to Mr. Clark and Mr. Mestrich because I am inclined to agree with your testimony. I must go to the 2 o'clock hearing.

Thank you, Mr. Chairman.

Mr. JOHNSON. The Chair thanks the gentleman.

We will proceed with Mr. Mestrich.

#### STATEMENT OF KEITH R. MESTRICH, DIRECTOR, SPECIAL SERVICES, FOOD AND ALLIED SERVICE TRADES DEPARTMENT, AFL-CIO

Mr. MESTRICH. I am Keith Mestrich, director of special services for the Food and Allied Services Trades Department of the AFL-CIO. F.A.S.T. represents 16 national and international unions with members in the food processing, hospitality, beverage production, and allied industries. Our affiliated unions have a cumulative membership of over 3.5 million working men and women.

Mr. Chairman, let me state from the outset that while F.A.S.T. supports industry and governmental efforts to suppress and control



the accumulation of grain dust, we do not support the use of water as the principal method of control. The use of water, in our opinion, is nothing more than an attempt to adulterate grain, make it heavier and, hence, more expensive. We view this operating mechanism as a threat to the integrity of our members' jobs and a long-term strategy of economic deception.

Quite simply, there are other equally effective methods of dust control we favor over the application of water. You have heard about many of them today. Let me take a minute to detail the hazards associated with grain dust.

Numerous studies show there is a positive relationship between exposure to grain dust and chronic pulmonary disease. Dust has been correlated with an increased incidence of asthma, bronchitis, and other respiratory ailments.

Grain dust is also among the most explosive materials known. The correct combination of dust, oxygen, and confinement when mixed with an ignition source can, and has all too often, resulted in deadly explosions.

Finally, the Clean Air Act Amendments of 1990 clearly identified grain dust as a potentially hazardous environmental pollutant. Just as workers' lungs can be damaged by the inhalation of grain dust, so, too, can the lungs of residents living near a grain elevator.

The contentions of Peavey and others in the grain industry that using water is the most feasible method for control are not justified.

Mr. Chairman, let me digress for a minute. I would be remiss if I came to the hearing today and neglected to point out what is undoubtedly the greatest irony in this entire controversy. While I do not intend to question the integrity of Peavy's support for the safety of their workers, I find it ironic their sister company—a meatpacking concern known as Monfort—has spent years trying to evade its responsibility when it comes to worker health, safety, and well-being.

The dichotomy and safety approaches between Peavey and Monfort, two companies under the same corporate rubric, is worth noting. The fact these subsidiaries will pervert and manipulate their approaches to health and safety is a sad commentary on how some companies view the protection of their workers and an important insight into the underlying nature of this debate.

Back to the issue of grain dust. There is a more effective method for controlling and suppressing grain dust than adding water to the product. Pneumatic dust collection equipment acts as a large vacuum, sucking up grain dust before it is allowed to accumulate on facility surfaces or become suspended in the air. The industry inherently recognizes the effectiveness of this technology. The industry has installed this equipment at their flagship facilities.

Pneumatic systems collect dust and do nothing to affect the integrity of the product. No foreign agent is added to the grain and the safety hazards are minimized.

The industry's principal argument against these systems is the costs associated with their installation. However, it has been demonstrated time and again that this argument is faulty. A more detailed analysis of these cost contentions is included in my written testimony.

Let me point out that we have often heard today that pneumatic systems would be quite expensive to install but no one has examined the cost of an effective nozzle system for water application. Our objections to the use of water come down to the question of integrity. When men and women go to work each and every day, they want to have pride in the products they produce or services they render. I know of no worker who wants to be involved in what appears to be a fraudulent practice.

Adding water or other liquid supplements to grain are both problematic. Were they the only known methods of dust control, we would obviously support their use; there are equally effective alternatives, however, which have none of the residual effects.

For the reasons I outlined above, Mr. Chairman, and members of the subcommittee, F.A.S.T. supports your efforts and those of the Federal Grain Inspection Service to prohibit use of water as a grain dust suppressant.

Thank you for the opportunity to present our views this afternoon. I would be happy to answer any questions you may have.

[The prepared statement of Mr. Mestrich appears at the conclusion of the hearing.]

Mr. JOHNSON. Thank you, Mr. Mestrich.

Mr. Clark.

#### **STATEMENT OF LARRY CLARK, SECRETARY-TREASURER, SUPERCARGOES AND CLERKS, LOCAL 40, INTERNATIONAL LONGSHOREMEN'S AND WAREHOUSEMEN'S UNION**

Mr. CLARK. Thank you, Mr. Chairman.

My name is Larry Clark. I am secretary-treasurer of supercargoes and clerk's, Local 40, of the International Longshoremen's & Warehousemen's Union, Portland, Oregon.

Last month, I completed my 40th year working on the Portland waterfront. During that time, I have served over 20 years in the category of supercargo. Supercargoes are charged with the responsibility of loading or discharging vessels and with the safe, efficient and proper handling of the cargo.

Our purpose here today is twofold: We are interested in jobs; we are interested in job safety. That is why we are here today.

For much of that time that I worked in those elevators, I worked at six of the nine elevators that are currently in position in the Columbia River. I have been charged with loading over 500 deep-sea ocean vessels. I would like to point out here there has never been one explosion in the Pacific Northwest in an export elevator. There have been fires, a few, very few; but never an explosion.

What we are concerned about is the safety of our workers, as I said, and we are concerned about the product that we are selling overseas, because that equates to jobs here. We know that there are other ways of controlling grain dust other than water. That is why we are here. We are interested in the economy of the country; we are interested in the safe workplace.

My testimony submitted in writing summarizes most of that. There are just a couple of things I would like to point out.

The perception in the Pacific Rim of U.S. products is very important to us in the Pacific Northwest. It is important to the farmers of this country who we believe produce a product second to none



when it comes to grain. Any contamination of that product impacts the jobs that we would have.

An example of that is Western White wheat. Some years ago, Western White wheat exported in large quantities from the Pacific Northwest was found to have, at certain times of the year, TCK smut damage to it because of moisture; not because of moisture somebody added, but just naturally added. The Pacific Rim stopped buying Western White wheat because of that. If they do that, then they will do the same thing with grain that is watered.

We do not believe grain watering is the answer. We believe that a dust-suppression system is the answer.

We know that there are evacuation systems to take the dust particulates out of the air that are required by the EPA, required by the DEQ—Department of Environmental Quality—to have minimum air standards. When that happened, all of the export elevators in the Pacific Northwest put in these dust-suppression systems, every one of them. They do not charge the producer for that equipment; they charge the vessel.

The vessel that receives that cargo, the owner or the charter, whoever it may be, that receives that cargo pays, in effect, 35 cents per short ton, 35 cents per 2,000 pounds for that equipment. That is an elevator charge to the vessel that is loading there. That equates to \$21,000 to a ship loading 55,000 tons of grain. At 100 ships a year, \$2.1 million. Ten years equals \$21.2 million that the elevator receives back from the vessel for that dust control system.

It isn't water. It is a dust system that vacuums up the dust particulates in the air, puts them in a silo. Then trucks come to the silo. Hog ranchers receive that dust to feed their hogs with. So the elevator operators are getting money at both ends of that system.

All the elevators do that; but only one elevator in our area waters the grain. About 100 miles north of there, in Tacoma, Washington, where Continental operates a grain elevator, they do not water the grain. They haven't had any water on any grain for 18 years or more in Tacoma.

So we believe that there are systems available. We totally agree with the Federal Grain Inspection Service's solution to this problem. We hope that the Congress will protect the quality of American grain and protect the quality of the workplace by taking action prohibiting the adding of water to grain.

Thank you.

[The prepared statement of Mr. Clark appears at the conclusion of the hearing.]

Mr. JOHNSON. Thank you, to all the members of this panel.

Mr. Mestrich, Mr. Clark, I would have to say candidly, there probably have been no witnesses today on any of the panels who have a greater concern about minimizing grain dust than the two of you. This has to do not just with marketability; it has to do with the very life and limb of your membership.

So I very much appreciate your testimony and your observations on this issue because I think because of the nature of the people you represent, you bring a great deal of credibility to the debate.

I also appreciate your pointing out this has to do not just with the explosiveness of grain dust but with the disease and other consequences that go with lack of proper handling. So this is not an

abstract, moot issue to the AFL-CIO or to the longshoremen. This is a real question of the physical health and integrity of your membership.

Mr. Richard, if we were to go to a permit system that involved expanding the FGIS inspectors and close monitoring to make sure the proper level of sophistication is maintained at each of these elevators, who do you anticipate would wind up paying for that? The general taxpayers? Ultimately the producers? Where do you see the buck stopping?

Mr. RICHARD. As in most cases, Mr. Chairman, I think the buck would stop with the farmer. I don't think that the Federal Government is going to want to add that number of FGIS inspectors and fund it through taxpayer's dollars. I think it would probably come through some sort of charge-off to the elevators involved, and then it would probably be another fee situation that would be passed down to the farmer and result in lower prices.

Not only would that be a problem; but as the watering systems were passed through the entire transportation and handling system for grain and cause that grain to be suspect by our trading partners, it would add a further detrimental aspect to prices, because they would be less apt to buy in us. The farmer would pay both ways.

Mr. JOHNSON. Mr. Nooter, so I correctly understand the Farm Bureau position, do you support a water based system only if it is in conjunction with a change to a dry matter basis for marketing? Or you prefer to go to dry matter basis, or would you support it even without the Senate version of the legislation, which is the permit system?

Mr. NOOTER. We would work in the regulatory process to advocate that this dry matter pricing structure be attached to the permit process so that the two would be combined. Our policy speaks in general terms of seeking to achieve dry matter pricing or standardized bushel pricing in the long run.

We are not advocating that, that there be legislative action at this point, or any time in the foreseeable future necessarily to require that. But with respect to the problems people have talked about, well, there is always the ability to abuse a water based system, we are saying, Let's make that a moot issue, let's take water out of the equation. Therefore, you will only use water in the right quantities to control the dust.

Mr. JOHNSON. So ultimately, you would like to get to a dry basis, but until then, you still would nonetheless support a permitted water process even absent the dry basis? At least until we get there?

Mr. NOOTER. We would tie the standardized bushel or dry matter basis to the permit so that those who choose to apply for a permit would be the—what they are giving up for that in some cases would be the adoption of the dry matter basis; so that anything, any grain moved through these facilities, you have removed from it the stigma of water that has been added.

Mr. JOHNSON. So they both go together?

Mr. NOOTER. Right.

Mr. JOHNSON. Thank you.

That helps me understand it. I think it does address some of the problems very well.

I want to thank the members of this panel, first for your patience, but also for the insights that you shared with us through a very brief oral discussion, but more importantly through the more in-depth insights you shared with us through your written statements. I find them very valuable to us and our membership has been kind of coming and going on this subcommittee today, but your written statements are shared with all of the members and probably more importantly than that with the staff. It will I think, contribute significantly toward helping us resolve the problem that is not on the distant horizon, it is before us this week and next week.

We have a sense of urgency to resolve this issue as we deal with the Senate. Obviously, we are overtaken on our authorization date goal here. It is important for us to get moving on this very quickly. So I really do appreciate your sharing with us your insights as we struggle with what is a controversial and somewhat contentious but important issue.

Thank you for joining us today.

With that, we will adjourn the subcommittee.

[Whereupon, at 2:20 p.m., the subcommittee was adjourned, to reconvene, subject to the call of the Chair.]

[Material submitted for inclusion in the record follows:]

## Statement of

Eugene Branstool  
Assistant Secretary  
Marketing and Inspection Services  
U.S. Department of Agriculture

before the  
Subcommittee on General Farm Commodities  
Committee on Agriculture  
United States House of Representatives

October 7, 1993

Mr. Chairman and Members of the Subcommittee:

I am Eugene Branstool, Assistant Secretary of the U.S. Department of Agriculture's (USDA) Marketing and Inspection Services (M&IS). Joining me today are David Galliard, Acting Administrator of FGIS; David Shipman, Director of FGIS' Field Management Division; and Kay Stang from FGIS' Compliance Division. We appreciate the opportunity to discuss the use of water to control grain dust.

During the past 2 years, there has been growing concern from virtually every segment of the grain industry about the use of water to control grain dust. I share this concern and feel that allowing this practice to continue will do irreparable harm to the reputation of U.S. grain in the domestic and world market.

In the August 4, 1993, Federal Register (58 FR 41439), FGIS proposed rulemaking to prohibit the application of water to grain. Since publication, we have received almost 100 comments-- 95 percent of which support the proposed rule. It is quite apparent that a majority of the grain industry believes that the primary purpose for applying water to grain is not to suppress dust, but rather to adulterate grain, increase its weight, and cheat buyers.



As a farmer myself, I feel that the U.S. produces some of the finest quality grain in the world today. I want U.S grain handlers to safeguard that quality, not degrade it. Adding water to grain increases the opportunity for mold growth and mycotoxin contamination. We need systems that promote and protect grain quality, not harm it.

Most grain handlers share my concerns. Archer Daniels Midland, Bunge Corporation, Cargill, Continental Grain, Louis Dreyfus, the Andersons, and over 50 farmer-owned coops throughout the Midwest have come out strongly in favor of a complete ban on the use of water. They know that water applied in even minute amounts will degrade quality and hurt the U.S.'s reputation in the international grain market.

End-users also understand the problems caused when water is added to grain. A major Colorado cattle feeder recently wrote:

"Raw water on grain increases weight unrealistically and reduces our ability to hold grain prior to processing and feed. The practice produces false weight readings and gives the impression the grain is of higher quality than it actually is when delivered. Improper weight puts our nutritional blends in error and cattle performance inevitably suffers."

This same concern is echoed nationwide by poultry processors, dry millers, maltsters, and feed processors. The concerns of foreign buyers are even more pointed. They view the addition of water as unacceptable and question why its taken so long to stop such a serious and obvious problem.

Grain dust is hazardous, but water is neither the best nor the most common method of dust control used today. In fact, research indicates that water is only minimally effective over the short-term and provides virtually no long-term control. And, if we continue to allow the use of water, we risk driving-up the cost of feed and processed grain products, and doing significant harm to the integrity of U.S. grain exports.

Even though I believe that the use of water should be banned, I also recognize that there may be other viable alternatives. For this reason, the proposed rulemaking action solicites suggestions and provides an extended comment period to allow interested groups an opportunity to develop alternatives. Considering the range and number of groups that have already commented on this proposed rule, it's my opinion that the issue should continue to be addressed through the rulemaking process, rather than by legislation.

Mr. Chairman, I've asked David Galliart, FGIS' Acting Administrator, to summarize for the committee the effect that banning water will have on grain elevator safety, the problems that have been already been caused by water use, and the difficulty in enforcing current or future restrictions. I would be happy to answer any questions you might have at this time or at the conclusion of Mr. Galliart's testimony.

(Attachment follows:)

## Proposed Rules

Federal Register

Vol. 58, No. 148

Wednesday, August 4, 1993

This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

### DEPARTMENT OF AGRICULTURE

#### Federal Grain Inspection Service

7 CFR Part 630

RIN 0580-AA25

#### Prohibition on Adding Water to Grain

AGENCY: Federal Grain Inspection Service, USDA.

ACTION: Proposed rule.

**SUMMARY:** The Federal Grain Inspection Service (FGIS) is proposing to revise the regulations under the United States Grain Standards Act (USGSA) to prohibit the application of water to grain. This prohibition would be applicable to all persons handling grain, not just those receiving official inspection and weighing services under the USGSA. FGIS has determined that water, which is sometimes applied as a dust suppressant, can be too easily misused to increase the weight of grain. Additionally, externally-applied water has a significant potential for degrading the quality of grain. This action would foster the marketing of grain of high quality to both domestic and foreign buyers and promote fair and honest weighing practices.

**DATES:** Comments must be received on or before December 2, 1993.

**ADDRESSES:** Written comments must be submitted to George Wollem, FGIS, USDA, room 0619 South Building, P.O. Box 96454, Washington, DC, 20090-6454; telex users may respond to IRSTAFF/FGIS/USDA; telex users may respond to 7607351, ANS:FGIS UC; and telecopy users may respond to the automatic telecopier machine at (202) 720-4628.

All comments received will be made available for public inspection in room 0632 USDA South Building, 1400 Independence Avenue SW., Washington, DC, during regular business hours (7 CFR 1.27(b)).

**FOR FURTHER INFORMATION CONTACT:** George Wollem, address as above, telephone (202) 720-0292.

#### SUPPLEMENTARY INFORMATION:

##### Executive Order 12291

This proposed rule has been issued in conformance with Executive Order 12291 and Departmental Regulation 1512-1. This action has been classified as nonmajor because it does not meet the criteria for a major regulation established in the Order.

##### Executive Order 12778

This proposed rule has been reviewed under Executive Order 12778, Civil Justice Reform. This action is not intended to have a retroactive effect. The United States Grain Standards Act provides in section 67g that no State or subdivision may require or impose any requirements or restrictions concerning the inspection, weighing, or description of grain under the Act. Otherwise, this proposed rule will not preempt any State or local laws, regulations, or policies, unless they present an irreconcilable conflict with this rule. There are no administrative procedures which must be exhausted prior to any judicial challenge to the provisions of this rule.

##### Regulatory Flexibility Act Certification

David R. Gallant, Acting Administrator, FGIS, has determined that this proposed rule will not have a significant economic impact on a substantial number of small entities. Most users of the official inspection and weighing services and those persons that perform those services do not meet the requirements for small entities as defined in the Regulatory Flexibility Act (5 U.S.C. 601 et seq.).

##### Information Collection Requirements

In accordance with the Paperwork Reduction Act of 1980 (44 U.S.C. chapter 35), the information collection requirements contained in the rule to be amended have been previously approved by OMB under control number 0580-0013.

##### Background

In the March 4, 1987, Federal Register (52 FR 6493), FGIS amended the regulations under the United States Grain Standards Act (USGSA) to establish provisions for officially inspecting and weighing additive-treated grain. These provisions were established to offer the grain industry the opportunity to utilize available dust

suppression technology, apply insect and fungi controls, and mark grain for identification purposes with Food and Drug Administration (FDA) approved additives.

Industry comments received during the rulemaking process supported the new provisions, but also expressed concern over the possible misuse of additives. A total of 15 comments were received. Three commenters were in favor of the then proposed regulations without any reservations. Two commenters were opposed to the proposed additive provisions, as related to dust-suppressing agents. They asserted, in part, that water may be added just to increase the weight of the grain. Additionally, three of the commenters who were in favor of the proposed provisions expressed concern about the potential for improper addition of additives for the purpose of adding weight to the grain. Applying any substance for the purpose of increasing weight is prohibited by the Food, Drug, and Cosmetic Act (see 21 U.S.C. 342(b)).

The final rule specified that if additives are applied during loading to outbound grain after sampling or weighing, or during unloading to inbound grain before sampling or weighing for the purpose of insect or fungi control, dust suppression, or identification, the inspection and/or weight certificate must show a statement that describes the type and purpose of the additive application. A statement was not required to be shown when additives are applied prior to sampling and weighing out-bound grain or after sampling and weighing inbound grain. But, all incidents or suspected incidents of unapproved additive usage or improper additive application were required to be reported to the appropriate Federal, State, or local authorities for action.

Even after establishing the labeling provisions for officially inspected and weighed additive-treated grain, FGIS continued to receive complaints about high moisture grain and improper use of additives. In 1992, several foreign and domestic grain merchants expressed concern over potential quality degradation due to water application and emphasized that alternative dust control techniques are available that are practical and effective. They also contended that the primary purpose of

applying water is to increase the weight of the grain, and, hereby, gain a market advantage. Furthermore, they expressed deep concern about possible negative market reaction by both domestic and foreign buyers; i.e., buyer confidence in U.S. grain will decline if concerns develop over potential quality degradation caused by water and "paying grain prices for water." Those who support allowing the application of water to grain contend that it is an effective method for reducing dust emissions.

In response to these concerns, FGIS recently amended sections 800.88 and 800.96 of the regulations under the USGSA to require a statement on official export inspection and weight certificates whenever water is applied to export grain at export port locations (58 FR 32111). The purpose of this action was to ensure that foreign buyers of U.S. grain are informed when additives have been applied to grain exported from export port locations. This action did not address non-export grain.

During and since development of the regulations requiring a statement on export grain certificates, numerous grain industry groups, including exporters, importers, millers, processors, and producers, have voiced their growing concern about the effect that the application of water has upon all U.S. grain, whether or not such grain is exported from the U.S. or even offered for official inspection and weighing services. They have stated—and available information confirms—that applying water to grain poses a risk to grain quality and can provide a strong incentive to improperly increase weight.

FGIS believes that the practice of adding water to grain indiscriminately may be occurring and that this practice not only adds weight but creates favorable conditions for microbial contamination of grain. Section 13(e)(1) of the USGSA (7 U.S.C. 87b) authorizes the Administrator of FGIS to prohibit the contamination of sound and pure grain as a result of the introduction of nongrain substances. Even though kernels of grain contain moisture, externally-applied water is a "nongrain substance." Therefore, FGIS proposes to prohibit the application of water to grain. This prohibition would apply to all persons handling grain—not just those receiving official services under the USGSA.

FGIS recognizes, however, that the amount of moisture in grain may increase due to natural environmental reasons during handling and storage. FGIS also realizes that water must be applied to grain during certain end-use processes. The proposed action does not

restrict either naturally-occurring moisture changes or the addition of water during milling, malting, or similar processing operations.

Although studies including research initiated by the National Grain and Feed Association which was conducted by the Department (see for example, Lai, F.S., Martin, C.R., and Miller, B.S., 1982, "Examining the Use of Additives to Control Grain Dust" and "Control of Grain Dust with a Water Spray") and industry experience indicates that applying water to grain can suppress dust, there are alternative dust control methods available and in use throughout the industry. Alternative methods such as pneumatic dust collection systems do not represent the same potential degradation of grain quality, and do not provide an equivalent incentive to increase weight.

Most elevators, including those that currently use water, already have pneumatic dust collection systems installed. Furthermore, many elevators that use water also have oil-based dust suppression systems in place that are more effective than water. These systems use either USP white mineral oil or food grade vegetable oil (e.g., soybean oil). Research has shown that water applied at a level of 0.3 percent to corn reduced the dust concentration by at least 80 percent on the gallery floor. At the same location, soybean oil or mineral oil applied at a level of 0.05 percent reduced dust by more than 90 percent.

Thus, even though water is more economical than mineral or vegetable oil (mineral oil costs over \$2 a gallon), far less oil is needed to control the same amount of dust. More importantly, oil is adsorbed (adheres) on grain, thereby providing long-term dust suppression. Water, on the other hand, is either absorbed (soaked-in) into grain or evaporates, and therefore, must be repeatedly applied. Consequently, FGIS believes that prohibiting water as a dust control method would neither increase the risk of elevator dust explosions nor have a significant economic impact on elevators that currently use water.

Proponents for applying water to grain suggest that the problem is merely the lack of enforcement of current FDA restrictions on applying any substance for the purpose of increasing weight. They have recommended that a licensing/permit program be established to allow firms to continue to use water, with certain restrictions. FGIS has considered this recommendation, as well as several other alternatives (e.g., require water weight to be deducted from grain weight, limit the rate of water application, and restrict water

applications to certain locations/conditions) and determined that any program for controlling or restricting water usage would be very difficult and expensive to administer. Testing and approving water application systems/equipment, controlling grain elevator inventories, monitoring the amount of water applied and the location of application, and prosecuting suspected violators would require a significant staff commitment and, even then, would be ineffective in preventing all abuses. Also, establishing any program that sanctions the use of water may create a perception of abuse that jeopardizes the reputation of all U.S. grain and undermines the grain industry's commitment to ensuring quality through good handling and storage practices.

FGIS believes that banning the use of water reflects current market needs and would have a positive economic impact on the U.S. grain industry. Furthermore, most of those that are currently applying water to grain are not small entities as defined in the Regulatory Flexibility Act (5 U.S.C. 601 et seq.). Therefore, this proposed action should have little or no impact on small businesses.

Comment, including data and views on this analysis and suggestions regarding any less burdensome or more efficient alternative that would accomplish the purposes described in this proposal, are solicited from interested parties.

#### Proposed Action

FGIS proposes to revise:

1. Section 800.61(b) to prohibit the addition of water to grain.
2. Section 800.61(d)(4) to exclude water as a dust suppressant.
3. Section 800.88(d) to eliminate the provision for adding water to export grain.
4. Section 800.96(c)(2) to eliminate the provision for adding water to export grain.

#### List of Subjects in 7 CFR Part 800

Administrative practice and procedure, Grain, Export.

For reasons set out in the preamble, 7 CFR part 800 is proposed to be amended as follows:

#### PART 800—GENERAL REGULATIONS

1. The authority citation for part 800 continues to read as follows:

Authority: Pub. L. 94-582, 90 Stat. 2887, as amended; (7 U.S.C. 71 et seq.).

2. Section 800.61 is amended to add a new paragraph (b)(3) to read as follows:



§ 800.61 Prohibited grain handling practices.

\* \* \* \* \*

(b) \* \* \*

(3) Add water to grain for purposes other than milling, melting, or similar processing operations.

\* \* \* \* \*

3. Section 800.61(d)(4) is revised to read as follows.

§ 800.61 Prohibited grain handling practices.

\* \* \* \* \*

(d) \* \* \*

(4) *Dust suppressants.* Grain may be treated with an additive, other than water, to suppress dust during handling. Elevators, other grain handlers, and their agents are responsible for the proper use and application of dust suppressants. Sections 800.88 and 800.96 include additional requirements for grain that is officially inspected and weighed.

4. Section 800.88(d) is revised to read as follows:

§ 800.68 Loss of identity.

\* \* \* \* \*

(d) *Additives.*<sup>1</sup> If additives are applied during loading to outbound, including export, grain after sampling or during unloading to inbound grain before sampling for the purpose of insect or fungi control, dust suppression, or identification, the inspection certificate shall show a statement showing the type and purpose of the additive application, except that no statement is required to be shown when the additive is a fumigant applied for the purpose of insect control.

5. Section 800.96(c)(2) is revised to read as follows:

§ 800.96 Weighing procedures.

\* \* \* \* \*

(c) \* \* \*

(2) *Additives.*<sup>1</sup> If additives are applied during loading to outbound, including export, grain after weighing or during unloading to inbound grain before weighing for the purpose of insect or fungi control, dust suppression, or identification, the weight certificate shall show the actual weight of the grain after the application of the additive for inbound grain or the actual weight of the grain prior to the application of the additive for outbound or export grain and a statement showing the type and purpose of the additive application, except that no statement is required to

be shown when the additive is a fumigant applied for the purpose of insect control.

\* \* \* \* \*

Dated July 27, 1993

D. R. Gallant,

Acting Administrator

[FR Doc. 93-18300 Filed 8-3-93; 8:45 am]

BILLING CODE 3410-01-40

<sup>1</sup> Elevators, other handlers of grain, and their agents are responsible for the additive's proper usage and application. Compliance with this section does not excuse compliance with applicable Federal, State, and local laws.

Statement of

David R. Galliard  
Acting Administrator  
Federal Grain Inspection Service  
U.S. Department of Agriculture

before the  
Subcommittee on General Farm Commodities  
Committee on Agriculture  
United States House of Representatives

October 7, 1993

Mr. Chairman and Members of the Subcommittee:

I am David R. Galliard, Acting Administrator of the U.S. Department of Agriculture's (USDA) Federal Grain Inspection Service (FGIS). I am joined today by David Shipman, Director of FGIS' Field Management Division. We appreciate the opportunity to discuss our views regarding the use of water to control grain dust.

For the past 13 years, FGIS has followed closely the various industry groups, researchers, and other government entities that have studied the efficacy of various grain dust suppressants, including water. And, without a doubt, liquid additives can suppress grain dust. But, the "problem" with water is not its theoretical effectiveness, but rather how it is actually used today and how it may be used tomorrow.

Throughout the grain industry, there is growing concern about the true intent and net effect of using water to control grain dust. Producers, elevator operators, exporters, importers, and processors are concerned about the effect that water has on grain quality. And, some believe--as does FGIS--that it is often used to increase weight.

This problem is not new. Major industry groups and companies have tried, without success, to address this issue. These groups now fear that, unless prompt action is taken, current economic pressures may encourage even more elevators to adulterate grain with water. These fears seem well grounded.

With FGIS' assistance, the USDA's Office of the Inspector General (OIG) and the Department of Justice are currently investigating several suspected incidents of improper water use. That is, applying water to increase weight. Let me share with you some of their findings:

- o An elevator blending dust-like foreign material with soybeans and then spraying water on this mixture, which caused the foreign material to adhere to the grain and avoid detection;
- o Elevators applying water to grain with fire hoses and thick un-nozzled pipes or repeatedly applying water to the same grain until it reaches the maximum moisture level allowed by contract; and
- o A barge of grain in which so much water had been added that the grain froze and seriously damaged elevator handling equipment.

It is unknown how many of the 10,000 plus grain elevators in this country apply water to grain. But we are concerned that the number is increasing due to economic pressure and the apparent lack of control by industry or government entities. As the number of water-users increases, so will the probability for abuse. For this reason, FGIS proposed a prohibition on applying water to grain, except for milling, malting, and similar processing operations. Today, I would like to briefly update you on this proposal and to address your questions regarding the use of water to control dust.

### The Safety Issue

Grain dust is created by the impact or abrasion of grain and includes bran flakes, fine broken brush hairs, particles of endosperm, weed seeds, pieces of chaff and straw, and soil. This dust is so fine that it easily becomes suspended in air and, as a result, can become fuel for potentially disastrous grain elevator explosions. Such explosions can shatter concrete bin walls and even lift bins of grain weighing hundreds of tons off of the ground. Fortunately, since the late 1970's, the number and magnitude of dust explosions has significantly declined. In 1977, there were 20 grain elevator explosions resulting in 65 deaths and 84 injuries. Fifteen of those who died were FGIS employees. In 1992, there were eight explosions, with one death and two injuries.

There are two key reasons for this dramatic turnaround: better engineering and greater awareness. Today, grain companies educate their managers and employees about the risks of dust explosions. Practices that were commonplace 15 years ago, such as smoking in elevators, are now prohibited by company policy and the Occupational Safety and Health Administration (OSHA). Elevators also have a wider variety of "tools" at their disposal. These include better smoke and heat detectors, improved bearings and buckets, blow-out panels and vents, fire and explosion suppression systems, improved cleaning techniques, and better dust control methods.

An overview of export elevator dust control programs helps focus this issue. Of the 63 active export grain elevators in the U.S., all have pneumatic dust collection capabilities, which vary greatly in design and operation. Nineteen (30 percent) also rely on a liquid dust suppressant, 16 (25 percent) use mineral or vegetable oil, and 3 (5 percent) use water.



Suppressing dust with oil and water is an "old" idea. Some industries, such as coal mining, have been using liquids to suppress dust for well over 100 years. For the past 13 years, FGIS has closely followed grain industry research of dust suppressants. In the early 1980's, FGIS oversaw the development of one of the first oil/water dust suppression systems at an export facility. The system was developed to suppress atmospheric dust emissions, not to reduce dust levels within the elevator itself, by spraying oil or water on the grain just before it left the load-out spout. The grain was weighed before the additive was applied, and a special statement regarding the application was placed on the inspection certificate to ensure that all interested parties knew of the application.

Several years later, the National Grain and Feed Association initiated a study, which was conducted by the USDA's Grain Marketing Research Laboratory, to determine the effectiveness of oil and water as dust suppressants within the confines of an elevator. This research culminated in the publication of the report, "Examining the Use of Additives to Control Grain Dust" (1982, Lai, F.S.; Martin, C.R.; and Miller, B.S.). This report clearly shows that additives that are applied properly and at the correct locations can reduce fugitive grain dust. Specifically, the research found that water applied at a level of 0.3 percent to corn reduced the dust concentration by approximately 80 percent, on the gallery floor. At the same location, soybean or mineral oil applied at a level of 0.05 percent reduced dust by more than 90 percent. Far less oil controlled the same amount of dust. More importantly, oil adheres to grain, thereby providing longer-term dust suppression. Water, on the other hand, is either absorbed into grain or evaporates. To be effective, water must be repeatedly applied or used in conjunction with other dust

control measures. But, if too much water is added, the grain will spoil and lodge in the bins requiring manual extraction, a dangerous process. In addition, wet grain often adheres to and cakes enclosures around belts and buckets. This increases the static electricity in these enclosed areas, which can become an ignition source for a dust explosion.

### Grain Quality Degradation and Weight Problems

Adding water to grain creates favorable conditions for microbial-contamination, which can, in turn, lead to heating and caking in extreme cases. Moisture is the major factor in grain storability, chiefly because of its influence on the growth of storage fungi. The number of days that grain can be safely stored decreases as the moisture level of the grain increases.

It is impossible to accurately predict the level at which the addition of water will cause quality degradation. Many variables influence the impact that added water has on grain quality; including, the condition of the grain, the method of storage and the storage temperature. Adding 0.3 percent of water, by weight, to grain may not significantly affect high quality/low moisture wheat when the ambient temperature and humidity are low. If, however, the grain is of poorer quality, or it has a higher internal moisture, or the temperature and humidity are high, then even a very small increase in moisture may cause the grain to spoil. Further, when water is added to grain, it is generally not distributed equally throughout the entire grain mass. Some kernels are soaked, while some are left dry, resulting in nonuniform quality and "hot spots" throughout the mass.

The practice of adding water to grain is especially troublesome to overseas buyers. In a letter to FGIS, Dr. C.J.M. Meerhoek, Executive Director of the European Community Seed Crushers and Oil Processors Federation (FEDIOL), said that, "Spraying water for dust suppression is considered to be an undesired practice . . . for quality reasons [and] for 'fair trade' reasons." Mr. Mitsuo Kurashige, Director of the Japan Oilseed Processors Association (JOPA), told FGIS that adding water to grain "does influence the accuracy of foreign material analysis and accordingly affects the differences of foreign material content between loading and unloading analysis." And, the Mielieraad Maize Board (South African corn importer) notified FGIS that, because of possible water-related quality problems, they will no longer purchase corn from U.S. export ports where water is added. These groups, as well as many U.S. companies, have asked FGIS to prohibit the addition of water to grain.

Adding water to grain increases the weight of grain without adding to its value. This invites tampering and misuse of water systems to increase profit. Adding as little as 0.3 percent water, by weight, can significantly enhance the small margins the grain industry operates under. For example:

By applying water at a 0.3 percent rate to a 50,000 metric ton (mt) shiplot of wheat, an exporter could (excluding subsequent evaporation) add 150 mt of water to the shipment. If the wheat was sold for \$128 per mt, the water could generate over \$ 19,000 in additional profit for the shipper.

FGIS believes that the ongoing OIG/Justice Department investigation will confirm that some grain elevators are applying water to grain in a manner inconsistent with sound dust control practices. Investigators have found elevators applying water at wrong locations, with improper equipment, and at excessive rates. As a result, wherein most grain elevators experience a shrinkage in grain stocks because of drying and handling; facilities using water inappropriately have increased their stocks.

#### Enforcement of Current Restrictions

Proponents for applying water to grain suggest that misuse can be effectively controlled by enforcing current Food and Drug Administration (FDA) and FGIS rules and restrictions. Unfortunately, rules regarding this practice are difficult to enforce or are not applicable to most situations. The FDA, the agency primarily responsible for preventing adulteration, continues to adhere to a policy articulated by former Associate Commissioner for Regulatory Affairs Joseph P. Hile, in August 1980:

"... the intentional addition of water to grain would appear to violate the Federal Food, Drug, and Cosmetic Act, which prohibits the unnecessary addition of water to food. Under section 402(b)(4) of the act, a food is deemed to be adulterated 'if any substance has been added thereto or mixed or packed therewith so as to increase its bulk or weight, or reduce its quality or strength or make it appear better or of greater value . . .'

If we encounter (grain) adulterated with water, we will consider appropriate regulatory action. We recognize that it may be necessary for an elevator to add small amounts of moisture to grain for safety reasons . . . The addition of moisture to grain for safety reasons is quite a different matter. . ."



Efforts to apply FDA's policy have been largely unsuccessful because of the difficulty in proving intent, defining "small amounts" of water, and distinguishing the process of applying water for safety purposes from adulteration.

Within the past 6 years, FGIS published two regulations that address certain aspects of additive applications. In 1987, FGIS promulgated regulations specifying that if additives are applied during loading to outbound grain after sampling or weighing, or during unloading to inbound grain before sampling or weighing for the purpose of insect or fungi control, dust suppression, or identification, the inspection and/or weight certificate must show a statement that describes the type and purpose of the additive application. These regulations, however, only apply to officially inspected or weighed grain and do not limit the application or restrict the usage of water.

Earlier this year, FGIS amended the regulations under the United States Grain Standards Act to require a disclosure statement on official export inspection and weight certificates whenever water is applied to export grain at export port locations. It has been suggested that a similar requirement be established for domestic grain. But, unlike exports, domestic grain shipments are not required to be officially inspected and weighed. Only an estimated 10 to 25 percent of all domestic grain shipments are officially inspected or weighed.

## Regulating Water Usage

Several industry groups and individual firms have recommended that FGIS develop a program for regulating--rather than prohibiting--the addition of water to grain for dust control purposes. Last spring, a grain company that is currently using water for dust control purposes suggested establishing a permit or licensing program to control water applications. FGIS considered the permit suggestion and concluded the process would not effectively prevent misuse and would create an economic incentive for all companies to apply water whether or not it is needed for dust suppression purposes.

The effectiveness of a permit system is compromised because FGIS cannot rely on after-the-fact product testing to verify proper application. It is technologically impossible to test grain and distinguish naturally occurring moisture from applied or added moisture. Consequently, a permit system must rely on an elaborate set of specifications involving water sources, application rates, metering devices, inventories, and the like. And while FGIS could evaluate an initial system and approve its installation, opportunities to override computer monitoring would exist with increased incentives to exploit any loopholes. Follow-up audits of systems would be time consuming, expensive, and minimally effective.

The current task of proving intent to increase weight would shift to proving intent to alter the approved system. Would a malfunctioning nozzle be an inadvertent mishap or intentional circumvention of the system?

We estimate that the annual cost of a permit system would quickly exceed \$1.5 million as more and more elevators are economically forced to apply water under the premise of dust suppression. And what is achieved by spending this

money: creation of a government-controlled program that will encourage grain handlers--even farmers--to apply water to grain. A program that will not be able to prevent willful abuse.

FGIS also considered several other alternatives such as requiring water weight to be deducted from grain weight, limiting the rate of water application, and restricting water applications to certain locations and conditions. The Agency determined that any program for controlling or restricting water usage would be very difficult and expensive to administer, require a significant staff commitment and, even then, could not effectively prevent all abuses.

#### Marketing Grain on a Dry Matter Basis

The concept of revising or reforming marketing practices to eliminate the economic incentive for adding water to grain has also surfaced as members of the grain industry have debated the consequences of adding water to grain. Several have discussed the benefits of marketing grain on a "dry matter" basis. According to Dr. Lowell Hill of the University of Illinois, a leading proponent of the "dry matter" or "standardized bushel" concept:

"Buying grain on the basis of a standardized bushel has several advantages. Perhaps the foremost is that it removes the economic incentives for adding water to grain. The Food and Drug Administration would no longer need to concern itself with enforcement of the unenforceable regulation relating to the addition of water to increase value. Most of the impetus for state regulation relating to moisture content of grain would also be eliminated. Price premiums would not be needed for overdry grain since moisture content would be used to determine quantity, not price. The elevator would no longer have to

monitor grain deliveries to identify grain with water added. Charges and discounts would be explicit rather than incorporated into a combined weight-price adjust factor."

FGIS believes that the industry should consider viable market reforms, such as the "standardized bushel" basis, as an alternative to direct prohibition of applying water to grain. But, whether this or any other reform should be adopted is a marketing issue outside FGIS' authority. FGIS is uncertain how to achieve any such market reform or ensure market discipline.

While the "standard bushel" concept is not an "FGIS issue," we offer some general observations on how a system might impact on inspection and weighing. Implementation of the "standardized bushel" would require accurate weighing and moisture measurement of all U.S. grain. The majority of elevator weighing systems appear adequate for this task; most moisture meters probably are not. Current moisture measurements are most critical at the base market level; e.g., 15.0 percent for corn and 13.0 percent for soybeans. But under the "standardized bushel" concept, all levels of moisture would have equal value since it would be directly tied to each market transaction. Hence, the results must be accurate through out the entire moisture range.

For the "standardized bushel" concept to deter misuse of water, moisture meters must not only be accurate, but must also be able to detect and measure externally-applied water. Available literature indicates that the accuracy of currently-used dielectric moisture meters are compromised if measurement occurs too soon after the application of water to the grain. A recent FGIS test demonstrated that when 0.3 percent of water is added to 11.97 percent moisture wheat, the moisture meter initially determined the wheat's moisture to be 12.63 percent. The results gradually decreased to the expected level of 12.27 percent over a 110-minute period.



## Conclusion

Grain dust is hazardous and controlling it is essential. But, applying water to grain poses a risk to grain quality and significant harm to the integrity of U.S. grain exports by providing a strong incentive to improperly increase weight. There are alternatives to water that are proven and effective methods for controlling grain dust.

It is imperative that both domestic and foreign buyers are confident that U.S. grain is pure and unadulterated. The perception that some U.S. grain shippers are applying excessive amounts of water to grain jeopardizes the reputation of all U.S. grain and the grain industry's commitment to quality. To undergird this commitment, the USDA has published a rulemaking action that proposes to prohibit the application of water to grain with certain limited exceptions. We believe that this proposed action reflects current market needs, would have a positive economic impact on the U.S. grain industry, and would ensure the integrity of U.S. grain in domestic and international markets.

**Use of Water for Dust Control in the Grain Industry  
Testimony by  
Joseph P. Botos, Vice President  
Cargill, Incorporated  
before the  
Subcommittee on General Farm Commodities  
of the  
House Committee on Agriculture  
October 7, 1993**

I am Joseph Botos. I am a vice president of Cargill, Incorporated, and manage the company's Environment, Health and Safety department. I oversee Cargill's environmental, health and safety policies, procedures and practices at our more than 800 facilities worldwide, including the workplace health and safety of the 67,000 people who work for Cargill. Cargill's businesses include grain handling and export; wheat, corn and soybean processing; barley malting and animal feeds.

I come to this position after 24 years in grain operations. Safety and grain quality issues have been central concerns throughout my career at Cargill. As a result, I have thought a lot about the interactions between plant and worker safety, environmental protection and grain quality. I enthusiastically support a ban on the addition of water to grain.

Cargill fully supports the mission and the reauthorization of the Federal Grain Inspection Service. We also have long supported and worked for a complete ban on the addition of water to grain. We favor the adoption of the proposed rule banning water-add that the Federal Grain Inspection Service published for comment. That rule reflects the prevailing consensus and practice in the grain industry. It is the rare exception when grain handlers apply water, but even then, it should be banned.

Cargill opposes the addition of water to grain because:

- adding water harms grain quality and makes customers less satisfied with the product.
- adding water is not prudent elevator management practice for minimizing risks of grain dust explosions and could divert attention from methods that truly do contribute to elevator safety.
- attempting to regulate water add would undermine the integrity of the U.S. grain-handling system.

In the interests of time, I am submitting a paper entitled "Water-Add in Grain," which provides a detailed explanation of my presentation today. I ask that it be made a part of the hearing record.

Let me say from the outset that I don't envy the task of this committee. You will hear emotional arguments and see many contradictions in these presentations here today. Those of us in the grain industry have heard most of them before. That is why the vast majority of those in the grain business oppose adding water to grain. We do not want to be forced by competitive pressures to do something we know will hurt the quality of our product. But make no mistake about it: that is exactly what will occur if the U.S. government attempts to regulate water-add.

Adding water to grain is detrimental to grain quality and storability, according to a 1982 study that looked at additives to suppress grain dust. That study found that added water tended to collect in the dust portion of the grain stream. This concentration of the added water creates the conditions that promote mold growth and insect infestation, which limits grain storability and creates unnecessary quality risks.



Now consider the effects of repeated applications. Permitting but regulating water add will lead toward water being added by each handler in the grain stream because it will reduce handling costs and potentially increase revenues. Customers who have a choice of suppliers may find the quality risks posed by the U.S. allowing water too high and they will favor other suppliers. It will make no difference if a firm tries to warrant that they have not added water -- they cannot guarantee what may have occurred at earlier handlings.

No doubt you will hear claims that water is a low cost option for dealing with dust. Let's consider true costs in that equation. Even if applications are at only 0.3 percent for corn, the effect of adding water is to create three-fourths of a cent on each bushel. On the 6 billion bushels of corn that move off farm annually, that is potentially \$45 million rolled into the price. The price for adding water to soybeans at similar rates would be slightly more than 2 cents per bushel, or \$40 million in a typical year. For wheat, the price effect is just under a penny a bushel or more than \$20 million.

That additional price -- or profit -- needs to be considered in the cold light of day. First, it would be charging grain prices for water. But for that additional \$100 million, not one additional pound of flour would be milled, not an ounce more of soybean oil, not an additional drop of corn sweetener or ethanol would be produced. And, the quality of those products, in fact, might be compromised by the practice.

As one cattle feeder noted, the practice produces false bushel weight readings and gives the impression that grain is of higher quality than it actually is when delivered. Improper weights put nutritional blends in error and cattle performance invariably suffers. No wonder customers are outraged.

Proponents of water-add claim its safety benefits outweigh its quality risks. We disagree. Sound facility safety management is built around prevention, not partial fixes. Prevention means careful layout and design of plant and equipment, including: moderating speed of equipment; enclosing equipment; utilizing controlled venting; pressurization of equipment, and avoiding long free falls, sharp angles and steep inclines in the grain-handling process. Design and layout should be supplemented with aspiration and air-cleaning equipment at critical points, proper preventive maintenance and housekeeping practices and installation of heat-sensing and motion-detection equipment.

Water-add is not a substitute for these other measures and is at the bottom of any sound safety checklist.

Use of liquid additives has a value in reducing fugitive dust emissions to the surrounding environment. But food grade mineral oil is more effective than water add in its initial application, does not require repetitive applications, does not create grain quality risks and is self-regulating. These benefits are largely environmental and should not be confused with the essentials of safe elevator management.

We believe that the federal government cannot regulate the addition of water to grain; it must ban it. There is no practical way to detect water add or to provide buyers with assurances of how much water was added in the course of the grain's movement from the farm to the ultimate consumer, when addition of water occurred, whether it was added in a uniform manner or whether the grain's subsequent storage and handling has created potential condition problems.

The fact is that no inspection system can do this for the entire U.S. grain handling system, including on-farm handling. It is neither physically possible nor economically sensible for the Federal Grain Inspection Service to do that when it is having to rationalize each dollar that it spends.

If the U.S. chooses to permit any addition of water to grain, addition of water at least up to that level will become the standard throughout the U.S. agricultural system. If it becomes permissible for one, competitive pressures will make it incumbent on all. America's reputation for grain quality and integrity as a supplier will be called into question.

We agree with the Federal Grain Inspection Service when they say they cannot regulate the practice of adding water today. We also believe that they cannot regulate it under other conditions--such as in systems where water weight is deducted from grain weight. Indeed, those systems create other problems for maintaining and ensuring grain quality. But, it is not necessary to get to that question.

Adding water to grain is potentially harmful to quality; it is vulnerable to abuse; it offers no assurances on safety that are not available through other, better techniques; and its environmental benefits are marginal and attainable in other, better ways. Since any program that attempts to oversee the addition of water to grain will end up compelling it, the better course is to ban the practice. That is what the Federal Grain Inspection Service has proposed to do. We believe they will do it and should be given the opportunity to do so.

Thank you.

(Attachments follow:)

## WATER-ADD IN GRAIN

### The Effects of Water-Add on Grain Quality

Cargill supports a regulatory ban on the addition of water to grain. We do not add water to grains we handle. Moreover, in our grain contracts we require sellers to warrant that they have not added water to grain. And, in our sales contracts we warrant that we have not added water to grain.

We have taken this stance because adding water to grain can damage grain quality and its storability. It can affect the way grains perform for our customers in processing. And it can create a perception among customers that would jeopardize the United States' reputation for ensuring grain quality.

Water obviously is a critical element in producing grain. It also is a critical element in many grain-processing activities to make the products needed by industry and consumers. But, putting water on the outside of grain kernels as part of the grain-handling process is the one point in the food chain where water is not needed and can be hurtful.

The reason is simple. Getting grain wet is deleterious to its quality. Water on a grain kernel promotes the growth of mold and other microbial contaminants. This is particularly true of broken or fractured kernels, which absorb a disproportionate amount of water. Moisture on grain kernels also promotes insect and rodent infestation.

These are not risks that begin after a certain quantity of water is added. Excessive moisture adds to the risk, but the risks begin building from the first application.

Risks to grain quality from water add also are a function of what happens to the grain subsequently. If the grain moves quickly through the handling system, is aerated and cooled, is not subject to repeated additions of water and is soon processed, quality risks from water add would be minimal. But, if grain is stored for a long period of time; if it does not receive good aeration and cooling; if it is put in a hot, humid environment that promotes deterioration; if water is added at a number of handling points, and if it is processed only after a long delay, the risks of quality deterioration escalate.



These latter conditions are widely prevalent in serving foreign customers. Grain can sit in vessel holds; it can move across climates to very hot, humid conditions; it is likely to be handled a number of times when water could be added; it can remain in storage for many months, and the delay between first handle and final processing routinely can be half a year or more. Since U.S. grains can move either to domestic or export markets, grain handling regulations need to be shaped to minimize quality risks not only in the best circumstances but also in the worst. Such assurance is especially important to the foreign buyer, who faces more risks of mishandling and who has readily available supply alternatives.

That is why we believe that adding water needs to be banned, not just regulated. The fact that it could be done under optimal conditions with little risk cannot be the test. The quality standard we must meet is the market's need where conditions are not optimal and where customers can turn to other suppliers outside the United States who do not add water.

The situation is different when grain moves from the handling system to the processing system. Once grain enters the processing system--flour milling, corn milling, barley malting, etc.--water is added as a part of the processing system to manufacture particular products. That process is continuous and carefully controlled by the processor. Recognizing this distinction, the proposed FGIS rule does not ban water add in grain processing; it only bans it in grain handling.

The FGIS proposed rule also does not prohibit water as a carrier in the application of fumigants or insecticides. The quantities involved are minuscule--much less than would be necessary to provide some level of dust suppression, for example. And the application of fumigants and insecticides is more easily detected, monitored and controlled.

Cargill believes that the FGIS proposed rule to ban the addition of water is carefully and properly drawn. It reflects a careful weighing of the risks to grain quality and of the danger that even changes in the perceptions of America's reputation for grain quality could shift buying to other suppliers. We believe the proposed rule conforms to general industry practices, the consensus of views within the grain-handling industry and the preference of most grain users.

### Water-Add as a Safety Measure

Some people argue that water is an effective dust suppressant that guards against deadly grain elevator explosions and saves lives. In making this argument for not banning water-add, they assert that the safety benefits outweigh the quality risks.

To assess this argument, we need to review the causes of grain-dust explosions and how those causes are best addressed. An analogy may be helpful here. If safety is the goal, is it better to try to keep something too wet to burn or is it better to prevent the fire by remedying the things that can cause it? We believe the latter course is the better and more responsible one.

Since the first grain elevators were constructed, there have been fires and explosions. But in the late 1970s and early 1980s, there was a sharp increase in the incidence of such disasters. In 1977 alone, there were 20 grain-dust explosions in the United States. Eleven more took place in the next two years. In response, a concerted effort by government and industry was undertaken to find ways to prevent future explosions.

Government and industry researchers found that a grain-dust explosion required these elements:

- o grain dust suspended in air
- o oxygen
- o an ignition source
- o a confined space.

Prudent elevator management seeks to reduce the amount of dust suspended in the air and to eliminate ignition sources.

The National Academy of Sciences (NAS) in a 1982 report recommended that the most cost effective step to reduce explosions was improved control of grain dust within elevators through concerted housekeeping programs. NAS recommended automatic suction and manual cleaning systems be installed to remove dust from within closed elevator spaces, particularly elevator "legs," the portion of the facility through which grain is transported from ground level to the top of elevator silos. Today, these systems are in place in nearly every facility.

Careful layout of plant and equipment is the most effective safety measure. Designing in safety includes moderating the speed of equipment, enclosing equipment, utilizing cross-venting in a controlled manner, avoiding long free-falls of grain, utilizing "dead boxes" and "choke feeds" and pressurizing equipment. These methods all enhance safety by keeping the dust embedded in the grain stream.

Supplementing good basic design by installing air-cleaning devices, such as cyclones and fabric filter systems, and by aspirating at critical points in the handling process also may be needed.

When you combine careful layout and design with preventive maintenance and housekeeping practices, you have the critical elements of dust control. Dust control provides a cleaner and healthier place to work, reduces overall maintenance costs, lowers insurance costs, helps control insect and rodent infestation, reduces shrinkage and loss of product, improves operating efficiency, improves relations with neighbors and, importantly, minimizes fire and explosion hazards.

Additional industry steps to reduce dust explosions and to increase elevator safety include:

- o locating potential ignition sources, particularly elevator legs, outside the elevator or installation of vents to relieve pressure where legs could not be moved;
- o widespread use of grain industry-sponsored (National Grain and Feed Association and Grain Elevator and Processing Society) fire and explosion training programs;
- o new OSHA grain handling standards, including electronic devices to monitor leg and belt-pulley speeds and temperature of bearings or the relocation of certain bearings outside of elevator legs;
- o locating (or venting) dust systems outside confined spaces;
- o use of inspection access points at head and tail of inside elevator legs;
- o pressure-drop gauges on dust control systems;
- o an industry standard of no more than 1/8 inch of grain dust within 25 feet of inside elevator legs;
- o tighter regulation of grain dryers;
- o required housekeeping practices, including controls on the use of compressed air; and
- o required cutting and welding permits.

Grain elevators have become more automated, and more elevator tasks have been moved outside the elevator, reducing employee exposure to dust or safety risks. More and better mechanical technologies are available to dry grain, convey it, suppress dust at spouts and remove it from legs. Management practices have improved. Many older and less safe facilities have been closed. All of these must be backed with sound safety training, since employees play the ultimate role in preventing explosions and in preserving lives.

This approach has worked. Improved dust-control systems, elevator management practices, elevator retrofitting and redesign and employee education have sharply reduced the number and devastation of grain elevator explosions and respiratory exposure to grain dust.

Using additives to suppress dust inside the elevator is not a significant component of an elevator safety program. Nor is it a substitute for these other steps. Prevention of problems is the proper management course, not reliance on partial fixes.

#### Additives to Reduce Environmental Pollution

While use of additives is not a necessary nor significant part of sound elevator safety management, we have learned that such additives can be a useful means of reducing fugitive dust emissions to the environment. Aspirating grain streams to control grain dust is still the baseline approach for reducing release of grain dust to the environment.

In fact, at our elevator in Portland, we handle 60-100 million bushels per year of the driest wheat produced in the United States. We use no liquid additives. Pneumatic dust control systems, properly designed equipment and use of enclosed equipment enable us to handle this dry grain without excessive dust emissions.

However, the addition of food grade mineral oil or vegetable oils also has proven an effective way to reduce dust emissions, especially in corn and, to a lesser extent, in soybeans and wheat. This technique is used particularly where proximity to neighbors makes controlling fugitive dust emissions to the air important.

Research has shown that addition of food grade mineral oil at the rate of 0.03 percent by weight to corn reduced dust accumulation on the gallery floor by 90 percent. The same tests showed that use of water at ten times that rate was still less effective. The reasons for this difference are relatively straightforward. Food grade mineral oil adheres to the kernel better. Moreover, as the grain tumbles, it spreads more evenly across the kernel.

The relative performance of food grade mineral oil and water as additives to reduce environmental pollution diverge even further over time. Oil persists on the kernel while water tends to collect, condense or evaporate. Water has to be re-added time after time to even approach the environmental benefits of a single food grade mineral oil application.

There also are times when the high-moisture content of grain makes it virtually impossible to add water and meet contract specifications. This makes water-add an even more limited tool for capturing the environmental benefits of lower fugitive dust emissions and further minimizes its role in promoting elevator or worker safety.

Use of food grade mineral oil as an additive for environmental dust-suppression benefits tends to be a self-regulating practice. The cost of applying the oil is about 3/10ths of a cent per bushel when applied at the rate of 1.5 gallons per thousand bushels of corn, so there is an ever present economic incentive to avoid over-application.

And it does not introduce risks of quality deterioration. It does not promote mold growth or insect infestations. Because it adheres to the kernel, it will not condense or collect in excessive quantities. Where a user does not wish to have oil added, he can so specify in the contract.

The essential points about use of additives to suppress grain dust are these:

- o the practice is not an integral part of a sound program for minimizing risks of grain dust fires and explosions; these are better addressed by efforts to control ignition sources and dust concentrations within confined spaces;
- o additives can be useful to reduce fugitive dust emissions to the environment, but these benefits can be captured better through use of food grade mineral oil than water add; and
- o the benefits of water add are small relative to the quality risks it introduces.



### Incentives to Undermine the Integrity of the System

We believe there is no compelling argument for adding water to grain, even in small or controlled quantities, to capture either elevator safety or environmental protection benefits. A sound program of design, operation, maintenance and education to avoid safety hazards is much preferable to reliance on water add. Similarly, use of food grade mineral oil to capture the environmental benefits of suppressed fugitive dust emissions is preferable to water add. And these preferences become even clearer when the risks to grain quality from water add are included in the equation.

Beyond these simple, straightforward and fact-based problems with adding water to grain is a subtle but pervasive effect such a practice would have on the U.S. grain system overall. Sanctioning water add would compel handlers at every stage in the grain handling system from inside the farm gate through end user to add water in order to remain on an even footing.

The problem is simply this. Addition of water temporarily adds weight to grain at no real cost to the applicator. Even at the level of 0.3 percent for corn (which was less effective as a dust suppressant than 1/10th that amount of food grade mineral oil), the effect at today's prices is to create 3/4ths of a penny per bushel of added value. On the 6 billion bushels of corn that move off farms each year, that is potentially \$45 million of additional value. The added value on soybeans today would exceed 2 cents per bushel, or \$40 million for the typical crop.

This additional value is ephemeral in two important respects. First, it is charging grain prices for water. Second, because water tends to evaporate, collect or condense, the additional value has to be recreated at successive handling points in order to recapture the gain.

As a result, adding water to grain puts every grain buyer at risk of paying for something he didn't receive. To avoid incurring that loss, he must add water again to recapture the benefit. The inevitable consequence will be to force the entire grain industry to add water to grain to avoid being placed at an unfair competitive disadvantage.

The effect of virtually forcing water to be added to grain across the entire handling system would be undesirable. Grain is handled as much as four or five times as it moves from the farm field, to the truck, to the country elevator, to terminals and eventually to end-users, processors or exporters. Each participant could be adding water, some perhaps on both inbound and outbound handlings. Some of the water could be soaked up by the grain. Some of the water could collect, condense or evaporate between handlings. It would depend on the grain's condition, the circumstances of how and where the water was applied and extenuating conditions. This much is clear, however. Repeated water additions would result in a cumulative wetting process that would have substantial and uneven effects on the quality of grain moving to market.

The cumulative effects and the uneven incidence of those effects would make it more difficult to maintain grain in good condition and to assure customers of uniform practices. The resulting uncertainties and increased handling risks would not be good for America's reputation for quality and integrity. Instead, customers would pay for grain weight they do not receive and have to accept quality risks that could be both large and unpredictable.

None of these consequences involve intentional abuse--that is, adding water just for weight gain. Because there are incentives to add water for weight gain and because it is nearly impossible to detect water add, this risk of abuse would also be cause for grave concern.

Proponents of adding water to grain have suggested either that the practice can be regulated or that settlement terms could be altered to remove the incentive to add water to gain weight. There are two major problems with these arguments.

The first is that the proposals are impractical. Regulating the addition of water on the farm would be impossible. For many country elevators it would be unrealistic; well over half the country elevators do not have outbound scales by which grain could be weighed before water add.

Settling contracts by excluding all consideration of moisture in grain--both moisture naturally occurring and that added--introduces new quality problems, including risks of cracking or breakage from overdrying. Paying on the basis of dry matter in order to permit water add also does not address the increased risk of mold growth and insect infestations that water add creates.



## National Grain and Feed Association

October 4, 1993

The Honorable Thomas A. Daschle  
United States Senate  
Washington, D.C. 20510

Dear Senator Daschle:

The National Grain and Feed Association (NGFA) applauds Senate passage of S.1490, to amend Public Law 100-518 and the U.S. Grain Standards Act, to reauthorize the operations of the Federal Grain Inspection Service (FGIS). This legislation will ensure that the agency can continue to provide a vital link in the successful marketing of U.S. agricultural products both domestically and in world markets.

Furthermore, we enthusiastically endorse the provision in S.1490 requiring the FGIS Administrator to develop and implement a cost containment plan to streamline and maximize the efficiency of the agency. We believe this plan responds substantively to the concerns of the GAO study and will prove to be a wise and prudent measure to ensure the continuation of a healthy and affordable official inspection system structured to maximize industry's use of the official system. The NGFA believes strongly that this provision should be retained in final legislation.

However, we are concerned about the provisions contained in Section 7(b) which prohibit the addition of water to grain except for milling, malting, or other processing or pest control operations and mandates that the Administrator "... shall allow, through the issuance of permits, the addition of water to grain to suppress dust unless the Administrator determines that the addition of water to grain materially reduces the quality of the grain or impedes the objectives of the Act."

On December 14, 1992, NGFA wrote the FGIS Administrator (see attached) requesting FGIS to issue "... an immediate ban on the addition of water to grain with exception of, for example, pesticides and dyes and when part of a contract." We believe that FGIS is the appropriate regulatory body to develop the details of such regulations because FGIS personnel have the necessary technical expertise.

The language of S.1490, in our view, unnecessarily restricts the discretion of FGIS in the rulemaking process. It may also have unintended consequences. For example, it would require FGIS to determine that water added for dust control does not adversely affect quality.

To our knowledge, there is very little information currently available to accurately assess the grain quality implications of this practice. As a result, FGIS may have to engage in costly and lengthy research to fulfill the legislated mandate which could unduly delay the regulatory process. It also does not address questions about the quality implications associated with repeated applications of water to grain by successive handlers in the marketing chain if permits become widely adopted. Furthermore, this legislative provision does not address the effect water application may have on the confidence of domestic and foreign buyers in the quality of U.S. grain. These perceptions could be damaging to U.S. sales despite scientific or safety justifications for the practice. Finally, S.1490 does not reference compliance with the Federal Food, Drug and Cosmetic Act, whose "mislabeling and anti-adulteration" provisions protect against unscrupulous practices, such as adding unnecessary weight.

There may be other technical considerations involving water usage that are not fully considered in this legislative language. For these reasons, we believe the inflexibility of the legislative mandate will unduly hamper FGIS in developing the proper regulatory policy regarding water addition initiated by FGIS in its August 4, 1993 regulatory proposal. The agency has allowed a 120-day comment period on its proposal, which provides more than ample time for producers, the grain handling industry, end-users and concerned members of Congress to provide input to ensure a well-reasoned final rule. We believe that U.S. Agriculture will be best served by FGIS resolving this issue using its expert judgment unhindered by prescriptive statutory language.

With the understanding that this legislative language was constructed with the best of intentions, we respectfully urge that Section 7(b) of S.1490 be removed to allow the regulatory process to move forward without further legislative mandates. We believe this action will lead to the optimal regulatory framework.

Thank you for considering this request. If you would like to discuss this matter further, please feel free to call me at (202) 289-0873.

Sincerely,

*Kendell Keith*  
Kendell Keith  
President

cc: Members of the Committee on Agriculture, U.S. House of Representatives

NATIONAL GRAIN TRADE COUNCIL  
SUITE 925

1300 L STREET, N.W.  
WASHINGTON, D. C. 20005

(202) 642-0400

RICHARD G. KERWIN  
CHAIRMAN

JERRY L. OSBORNE  
VICE CHAIRMAN

October 6, 1993

The Honorable Tim Johnson  
Chairman  
Subcommittee on General Farm Commodities  
Committee on Agriculture  
U.S. House of Representatives  
2438 Rayburn House Office Building  
Washington, DC 20515-2427

Dear Mr. Chairman:

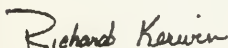
We understand the Subcommittee will be meeting on October 7 to hear testimony on the Federal Grain Inspection Service's proposed rule to prohibit the use of water to suppress grain dust. The Council would like to take this opportunity to share its views with you on the matter.

The Council's membership has divergent views on the merits of using water as a dust suppressant. A number of members favor prohibiting the practice because they believe the addition of water can degrade grain quality. They argue there are other, more appropriate, means to suppress dust. There are other members who favor regulating, not prohibiting, the practice because they believe it does not harm grain quality. These members believe water is the most effective dust suppressant.

On balance, though, a clear majority of the Council's Executive Committee would support a prohibition on the use of water as a dust suppressant. The Executive Committee is unanimous in opposing the addition of water for the purpose of adding weight to grain.

We hope our thoughts on this matter are constructive and will be helpful to your deliberations.

Respectfully,



Richard G. Kerwin  
Chairman



## Grain Elevator &amp; Processing Society

Box 19026, Commerce Station

Minneapolis, Minnesota 55415-0026

(612) 338-4423



6 October, 1993

COPY

Mr. George W. Mollen  
Federal Grain Inspection Service  
U.S. DEPARTMENT OF AGRICULTURE  
Room 0824 South Building  
P.O. Box 96454  
Washington, D.C. 20090-6454

202/720-0292  
FAX 720-4828

RE: FGIS PROPOSED RULE

: Prohibition on Adding Water to Grain  
: 7 CFR Part 800 (81; 88; & 98)  
: FR Vol 58, No. 148.

Dear Mr. Mollen:

The Grain Elevator and Processing Society (GEAPS) appreciates this opportunity to respond to the FGIS Proposed Rule — "Prohibition on Adding Water to Grain," 7 CFR Part 800 (81; 88; & 98), as published in the Federal Register, Volume 58, No. 148, Wednesday, 4 August, 1993, pp.41439-41441.

We understand that the rule, if adopted as proposed, would prohibit the application of water to grain for purposes other than milling, wetting or similar processing operations. We also understand that the rule would not prohibit or further restrict the application of water-based additives — such as fungicides or pesticides — otherwise allowed, provided that such application is consistent with currently approved methods and limits; nor would the rule place any restriction or limit on naturally-occurring moisture changes. We recognize that the proposed rule would apply to all U.S. interior and export port grain handling operations.

The GEAPS Grades & Weights Committee reviewed the proposed rule and commends FGIS for recognizing and responding to the important issues raised by the concept of adding water to grain. After careful consideration, GEAPS supports the FGIS proposed rule as being consistent with our position on this issue reflected in my 15 May, 1992, letter to FGIS Administrator John Foltz (copy attached).

With respect to the issues of operational and economic impact, GEAPS suggests that sanctioning the application of water through regulatory control would create the greater problem. If water application is allowed through regulation, all grain handling operations from farm to export will likely be forced to adopt the practice to remain economically competitive. We cannot envision an efficient, practical and effective regulatory compliance monitoring and enforcement plan. We believe that the scope and complexity of such a compliance program would require substantial commitment of human and financial resources. It is most likely that only large companies or high-volume throughput operations would be able to incur the cost of supporting a water application regulation program. Allowing restricted water application could have a much greater potential impact on small business than would adopting the proposed rule.

George W. Wollan, USDA FGIS  
Page 2 of 2

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We recognize that the application of water to grain can reduce fugitive dust emissions — an important safety, health and environmental objective. However, GEAPS believes that in the final analysis, because equally or more effective and efficient dust control strategies are available, prohibiting water application is currently the most practical way to sustain the integrity of the domestic and export grain industry by eliminating concerns about the potential quality implications.

GEAPS is an international professional society representing the operational interests of grain handlers and processors. The majority of GEAPS' some 3,000 members are operations management and supervisory personnel, engineers and other technical specialists employed in or associated with the grain handling and processing industries throughout the U.S. Our response reflects our concern about the potential impact of allowing water application to grain.

Thank you in advance for your consideration of GEAPS' position on this issue. As always, we stand ready to answer any questions you may have.

Respectfully,

*[Signature]*  
Donna L. Kraus  
Executive Vice President

- c. David Gallert, FGIS acting administrator  
Brien Butz, committee liaison, GEAPS International Board  
Warren Duffy, chair, GEAPS Grades & Weights Committee  
Bill Riemann, GEAPS International president

TESTIMONY BY

DAVID C. LYONS

BEFORE THE SUBCOMMITTEE ON  
GENERAL FARM COMMODITIES OF THE  
COMMITTEE ON AGRICULTURE  
OF THE  
HOUSE OF REPRESENTATIVES  
OCTOBER 7, 1993

Mr. Chairman and members of the committee:

I want to express my thanks to the committee for inviting me to testify today on an issue of vital importance to the integrity of the United States grain marketing system - the question of adding water to grain as a means of dust suppression.

I am Dave Lyons, Vice President for Government Relations for Louis Dreyfus Corporation.

Louis Dreyfus Corporation (LDC) is a major merchandiser and exporter of United States grains, oilseeds and rice. LDC owns or operates four export terminals, forty-six interior facilities and two rice mills with a total of almost eight million bushels of storage capacity. These facilities are located in fourteen states and one Canadian province.

I am appearing before you today to urge that the practice of adding water to grain as a means of dust control be totally prohibited. Dust suppression and control is a topic of vital interest to all participants in the U.S. grain handling industry for three reasons.

First, the U.S. grain industry has a tragic history of elevator fires and explosions. In the late seventies, we saw several elevator explosions which claimed tens of lives and caused millions of dollars of property damage. The

research generated by these tragedies has conclusively shown that grain dust accumulations inside the elevator are one of the primary factors in potential explosions and fires. For this reason alone, we must have effective and reliable dust control systems in all grain handling facilities.

Second, aside from removing the danger of fire or explosion, dust control is essential in providing a clean and healthy workplace for all employees. Although there is no scientific evidence that exposure to grain dust poses any health hazards to elevator workers, it is only common sense and good business to provide the cleanest possible workplace for all employees.

Third, control of dust emissions to the outside air is the responsibility of all of us in the grain handling industry. It is our duty to preserve and protect the environment for all citizens of the localities where grain handling and processing facilities are located.

It is common sense that the use of water will suppress dust in a grain handling facility. However, the use of water is not the normal industry practice for controlling dust. There are many technologies used today by elevator operators. Many of these alternatives are summarized in Chapter II of Retrofitting and Constructing Grain Elevators, a publication of the National Grain and Feed Association.

Each LDC facility has a dust control strategy using various technologies. Filtering systems, enclosed drag conveyers, pit aspiration and food grade mineral oil application are just a few of the systems we use either singly or in combination based on the layout and usage of each facility. At no LDC facility is the usage of water used as a method of dust control.

The experience and safety record of Louis Dreyfus and the rest of the industry shows that the addition of water is not necessary for dust control. Elevators will not catch fire or explode if addition of water is prohibited. Elevator employees will not have to work in an unclean work environment nor will the environment have to suffer if water addition is prohibited.

The addition of water takes place in the industry because it provides the opportunity for the elevator operator to add weight to the commodity. Practically all members of the grain industry consider the addition of water to be economic "adulteration" which is prohibited by the Food and Drug

Administration. In fact, it has only been in the past year that it has become known that one of the major companies is routinely adding water to grain.

The economic incentive to add water in order to add weight is huge. The U.S. grain marketing industry typically operates on small margins which are fractions of a cent per bushel. If an exporter adds one half of one percent of water to a six dollar bushel of soybeans, this represents three cents per bushel, over one dollar per ton, and more than fifty thousand dollars for every fifty thousand metric ton export cargo. The foreign customer is paying for fifty thousand dollars worth of soybeans which he will never receive. Instead, that same fifty thousand dollars goes directly to the operating revenues of the loading facility. This powerful economic incentive alone is reason enough to prohibit this practice.

Addition of water, especially, if it occurs several times in the U.S. grain marketing system, may adversely affect the quality of the commodity, especially, as it is stored for long periods of time on inland river barges or on board an ocean going vessel destined for the foreign customer. This deterioration in quality obviously leads to a decrease in the value of the commodity and may also lead to an increase in complaints about the quality of U.S. grain from foreign buyers. Thus, in order to maintain the integrity of U.S. grain quality it is imperative that this practice be prohibited.

Any attempt to regulate this practice, such as the Senate passed language which mandates the Federal Grain Inspection Service (FGIS) to consider a permit process, will likely result in the proliferation of the practice though out the total U.S. grain marketing system. Competitive pressures will force many grain handling firms to add water at various steps in the U.S. grain marketing system. Potentially, water might be added a half dozen times or more from the farm to final end user. Is this the type of grain marketing system the U.S. wants to have?

How would the FGIS regulate the practice of adding water? There are approximately ten thousand grain handling facilities in the United States. To enforce any type of regulation would require a minimum of one inspector at each of these ten thousand facilities every time the facility was in operation. However, even this vast expenditure of resources and manpower would not be enough to prevent the surreptitious addition of water when an inspector was not present.



The addition of water to grain does not lend itself to compromise. If you allow addition of water in some form, then competitive pressures will cause proliferation through the industry. Resolution of issues which can not be compromised is not easily addressed in the legislative process. Issues pertaining to grain quality can usually be best addressed through the rulemaking process by the FGIS. In August, the FGIS issued a proposed rule banning the addition of water.

Since the Congress is not able to legislate a strict ban, then the Congress should approve FGIS reauthorization without any language pertaining to addition of water. This would allow FGIS to proceed with proposed rulemaking without interference from Congress. The prohibition which seems very likely to come out of the rulemaking process will send a strong signal to foreign and domestic buyers of the integrity of the U.S. grain marketing system.

Statement of

Steven A. McCoy  
President

NORTH AMERICAN EXPORT GRAIN ASSOCIATION

Before a Hearing of the  
HOUSE GENERAL FARM COMMODITIES SUBCOMMITTEE  
October 7, 1993

Mr. Chairman, thank you for the opportunity to appear before the Subcommittee today. I am Steve McCoy, President of the North American Export Grain Association (NAEGA), the national association of U.S. grain and oilseeds exporting companies and cooperatives. I have a brief statement to make.

I want to assure you that all the companies and cooperatives that make up the NAEGA membership share an absolute commitment and determination to ensure the safe operation of the facilities they own and operate. Safety is a paramount concern of the entire U.S. export grain industry. You will have an opportunity to speak with safety experts today, so I will not dwell on this point. I will focus my comments on other aspects of the issue before you.

NAEGA supports the Federal Grain Inspection Service (FGIS) proposed rule that would prohibit the addition of water to grain for purposes other than "milling, malting or similar processing operations", and other currently approved Food and Drug Administration (FDA) uses.

We do so because we are concerned that no regulatory framework exists that provides a full and necessary assurance that the practice of water addition to grain (for purposes other than those allowed by FGIS under the proposed rule) would not, in the future, be subject to some form of abuse.

Abuse of such a regulatory system would undercut perceptions regarding the quality of U.S. grain and the integrity of the U.S. grain marketing system, and, thereby, the competitiveness of U.S. grain in international commerce.

The matter of water addition is, as you know, currently before the FGIS. NAEGA believes that the rulemaking process currently underway provides the best and fullest opportunity for all views in this matter to be properly weighed and adjudged.

We support the House approach in this matter (which is silent on the issue of the addition of water to grain) and urge you not to recede to the Senate provision of S.1490 that would allow the application of water for dust suppression under certain specified conditions.

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We will be making our views known to FGIS, and we encourage others to do so.

Mr. Chairman, that concludes my remarks. I am happy to respond to any questions you may have.

STATEMENT OF  
LOWELL D. HILL  
L.J. NORTON PROFESSOR  
DEPARTMENT OF AGRICULTURAL ECONOMICS  
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

BEFORE THE SUBCOMMITTEE ON:  
GENERAL FARM COMMODITIES  
U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON AGRICULTURE  
RELATED TO ADDING WATER TO GRAIN

October 7, 1993

Washington, D.C.

## TESTIMONY ON REWETTING GRAIN

Lowell D. Hill

**History**

Problems of rewetting grain have a long history. As far back as the early 1700's French grain merchants were accused of using water to "freshen" grain and swell its volume. The word "freshen" sounds a lot like a euphemism for dust control. In 1914 J.W.T. Duvel of the Bureau of Standards, USDA accused grain elevators of "spraying dry wheat with water prior to loading for shipment, for the purpose of increasing the weight". In the fall of 1915, the practice of adding water to oats created a scandal of sufficient magnitude that Agriculture Secretary Houston added a statement to grade standards regulations: "Nothing herein shall be construed as authorizing the adulteration of oats by the addition of water". Again in 1925, USDA informed the grain industry that adding water to grain was "unethical and inimical to good business", and had been declared illegal adulteration under the Federal Food, Drug and Cosmetic Act. Note the date of 1925. Following research at Oklahoma State University in 1981 which demonstrated that rewet and naturally wet grain had essentially the same storability characteristics, FDA clarified its prohibition against rewetting. "Thus, the intentional addition of water to grain to increase its bulk or weight or to make it appear to be better or of greater value than it is results in the adulteration of the product". Note that the addition of water to grain **regardless of the purpose** will increase its bulk and weight, but FDA ruled that the criterion to differentiate between good management practices and illegal actions was the motive. Once the motive had been established, the adulteration clause applied to all methods of adding water including misting, aeration, uncovered trucks during a rainstorm, blending wet and dry grain together, and presumably harvesting soybeans in the early morning instead of late afternoon. Following an aborted effort to prosecute a Michigan farmer for adding water to grain before delivering it to the elevator, FDA resigned itself to prosecuting only flagrant violations that generated formal complaints. Motive is exceedingly difficult to prove, especially when the end result is the same regardless of the motive.

**Incentives for Rewetting**

There are several reasons for adding water to grain.

## 1. To improve quality.

Processors moisten grain to improve its milling qualities. Grain handlers have also found that breakage can be reduced by increasing the average moisture content of corn through blending or misting, or aerating. Aeration-induced warming during spring and summer adds moisture even though the primary purpose is to equalize grain and air temperatures.

## 2. To suppress dust.

Note that I did not say "remove dust". Appearance of corn is temporarily improved by dust suppression, but the amount of dust in the grain and the problems of dust control at subsequent points in the market channel are not reduced by adding water.

## 3. To alter the response of electronic moisture meters.

It has been suggested that the addition of water to grain results in incorrect readings on dielectric meters. Research has demonstrated that surface water causes the meter to read **higher** than true moisture if the reading is taken within a few minutes following the application of the water. Any advantage from "fooling" the meter is a gain to the buyer, not the seller. The



discrepancy between true moisture and meter reading declines rapidly, approaching zero within one to two hours. Final equilibrium may require from 2 to 60 hours depending on factors such as temperature, beginning moisture, and grain characteristics. I have found no published research that suggests that rewetting can lower the reading on dielectric meters. (see attachment 1 and 2).

#### 4. To increase the weight of the grain.

The addition of water to grain can generate additional income from grain only if the moisture content of that grain is below the moisture content set by the market for the base price. If the price per pound or per ton is the same for 14 percent moisture corn as for 15 percent moisture corn, the seller has an incentive to add water. The seller receives corn price for water up to the moisture level specified by the market or the contract. Obviously, there is no incentive to add water to grain that is above the base moisture, since most buyers will use their shrink factor to subtract the excess weight of water from the quantity. Moisture above the base level is considered by grain buyers to determine **quantity** not **quality**. Once the buyer has reduced the quantity of wet grain to the equivalent quantity of dry grain there is an additional penalty in the form of a drying charge. However the penalty for grain at moisture levels below the base is larger than the penalty for moisture above the base. For example corn brought to the market at 13 percent moisture receives a hidden discount of 5.5 cents per bushel because the total weight has been reduced by loss of water. The drying charge for corn at 17 percent moisture varies from 3 to 5 cents per bushel, and most of that is simply a cost of drying--not a penalty.

#### Costs Associated With Rewetting

Rewetting grain is an undesirable practice in most cases. The problems and costs associated with the practice include:

##### 1. Potential mold growth.

Surface moisture encourages mold, insect, and bacterial activity. However, storage problems associated with average moisture content of a grain mass should not be attributed to the rewetting process. Grain stored or transported at moisture levels that encourage development of mold presents the same problems whether that moisture was achieved by rewetting or by drying. Naturally wet grain presents the same storage characteristics as rewetted grain.

##### 2. Foreign buyer's perceptions.

Foreign as well as domestic buyers are concerned about grain handling practices that might increase molding and kernel damage. As indicated above, research has demonstrated that the important factor influencing mold growth is the moisture level, not the method by which it was achieved. However perceptions are important. In addition, foreign buyers have traditionally received windfall profits by contracting for 14 percent moisture soybeans and receiving 12 percent at destination. Efforts by exporters to deliver according to the contract moisture are not appreciated by the importer whether the higher moisture level is achieved by blending or by rewetting. Japanese corn processors have personally expressed their disappointment in the recent upward trend in moisture contents even though moisture content at destination is below that specified in the contract.

##### 3. Poor technology.

The methods used in adding water have often been very crude, resulting in uneven distribution within the grain mass and therefore poor absorption within the kernels. Research on rewetting has usually been conducted under controlled conditions. If the water is not evenly distributed and is not absorbed by the kernels, the results can be disastrous.

### Solutions to the Problem

Several approaches have been proposed to solving the problems created by adding water to grain. It is important to examine each and the potential effectiveness and consequences.

#### 1. Regulation and prohibition

Current technology does not enable inspectors to differentiate between grain that has been rewetted and grain that has been naturally dried to the same moisture content. Regulatory prohibitions will be extremely difficult to enforce because it is focused on the **process** not the **product**. It is not illegal to store, sell or transport high moisture grain, regardless of the effect on storability; it is only illegal to use certain methods to achieve that moisture content ever, if there is no detrimental effect on quality. There are many methods of adding moisture to grain -- blending, aerating, failure to use proper drying, selecting the time of day for harvesting, and (of course) some form of watering device (see attachment 3). In general, it is impossible to detect which method was used. FGIS (and FDA) are being asked to regulate motive and prove intent. The FDA has already stated that the addition of water to grain for the purpose of increasing its weight is adulteration. Since the addition of water for **any purpose**, increases its weight, the use of water even for dust control is adulteration under FDA rules. Any enforcement must rely on the motives of the firm. Changes in moisture content -- up as well as down -- are a normal process occurring in nature. Grain absorbs moisture from the air during harvest, aeration, and transfer from barges to ocean vessels (see attachment 4). I submit that a prohibition against changing the moisture content of grain is unenforceable.

#### 2. Remove the Incentives

The primary incentive for adding water to grain for purposes other than dust control, is the result of the current method for pricing grain. Since grain below the base moisture receives the same price per pound as grain with moisture content at the base moisture, water added to the dry grain has a value equal to the price of the grain. That is a high price to pay for water. Grain dealers recognize that they cannot pay grain prices for water and have developed shrink formulas to allow them to adjust the quantity of wet grain to the equivalent bushels at the base moisture. Few elevators are willing to apply that same formula to grain below the base moisture because it would eliminate one of their sources of income -- income that is taken primarily from those producers delivering corn in the best possible condition. Several elevators have discovered that they can remove the incentive for farmers to add water to grain by adjusting price to encourage delivery of dry grain. In a recent survey in Illinois, 14 percent of the elevators were adjusting price or quantity to compensate for the loss of weight when dry grain is sold (see attachment 5).

### Solution

The obvious solution is to base the weight of grain for commercial transactions on the dry matter that it contains. The scale weight would be adjusted to the equivalent weight or bushels at the base moisture, a procedure now being used by the grain industry. The use of the **equivalent bushel** concept could solve two problems at once. First, the addition of water to grain would virtually disappear. Second, the motive and intent criterion imposed by FDA would no longer exist -- it would be impossible to add water to grain "for the purpose of increasing its value" because addition of water to grain would **not increase its value**. Grain priced on the basis of the dry matter it contained would have the same value no matter how much or little moisture it contained. There would no longer be any economic benefit to sellers to add moisture to dry grain because it would not increase the quantity sold (see attachment 6).

### Advantages of the Equivalent Bushel

1. It removes the incentive for adding water to grain to increase its weight.
2. It separates the determination of quantity from the determination of quality.
3. It allows producers and marketing firms to select the optimum moisture content for managing storage, handling, and quality without being penalized on quantity.
4. It eliminates the inequity among sellers, requiring payment according to value.
5. It provides a more uniform basis for the export trade. Foreign buyers receiving 14 percent moisture corn on a 15 percent moisture contract, will be required to pay for the extra dry matter.

### Recommendations

Require that all certificates showing official weights also show the equivalent bushels adjusted to the base moisture:

Encourage the entire grain industry to purchase grain on the basis of weights adjusted to equivalent bushels.

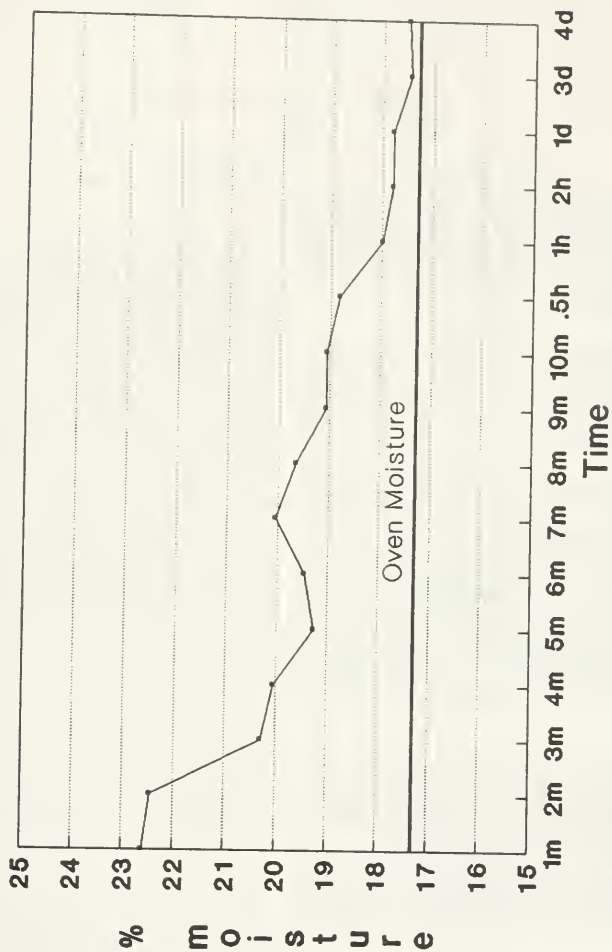
Rescind the FGIS and FDA ruling that the adding of water for dust control is exempted from FDA's definition of adulteration, retaining the FDA statement that the addition of water for purposes of increasing its weight is adulteration. This remains unenforceable except for flagrant violations, but the incentive of weight gain would be removed with the equivalent bushel method.

Issue a set of tables as part of the Official United States Grain Standards, specifying the weight of dry matter required to equal an equivalent bushel of each grain at various moisture levels.

### Attachments

1. Effect of rewetting on moisture readings on the Motomco meter, 1993. Department of Agricultural Economics, College of Agriculture, University of Illinois at Urbana-Champaign.
2. Moisture absorption by wheat, 1982. P. D. Bloome, G. H. Brusewitz, D. C. Abbott. American Society of Agricultural Engineers, 0001-2351/82/2504-1071.
3. Letters from Dr. Hill to Mr. Shumato, FDA, 1982.
4. Grain picks up weight from moisture, 1976. Milling & Baking News, Aug. 10, 1976. C. M. Christensen, H. H. Kaufmann, A. Hawk, and F. Wade. "Gain in Weight of Grains and Grain Products Exposed to Relative Humidities of 80 - 90%" University of Minnesota Agriculture Experiment Station, Miscellaneous Journal, Series No. 1632, in part.
5. A Grain Industry Solution to the Rewetting Problem, AE-4594, 1985. Lowell D. Hill and Robert Spangler. Department of Agricultural Economics, Agricultural Experiment Station, College of Agriculture, University of Illinois at Urbana-champaign.
6. Hidden Discounts in Grain and the Incentive for Rewetting. Lowell D. Hill. Farm Economics Facts and Opinions. 93-11, September 93. 5 pages. Department of Agricultural Economics, College of Agriculture, University of Illinois at Urbana-Champaign.

# Meter Reading on Rewetted Corn



m=minutes after rewetting;  
h=hours; d=days

## Moisture Absorption by Wheat

P. D. Bloome, G. H. Brusewitz, D. C. Abbott

MEMBER  
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## ABSTRACT

MANY studies have been reported concerning the drying of grain. The absorption of water by grain has been studied in much less detail. Laboratory experiments to determine the practicality of adding water to very dry wheat were conducted. Field studies of a procedure that matches grain and water flow rates and uses a transport auger for mixing are reported.

## INTRODUCTION

Before harvest and during harvest, handling, transportation and storage, grain contains moisture in varying amounts. The moisture content of grain fluctuates according to the laws of heat and mass transfer. Grain moisture measurement and control are important management aspects of grain production, handling and utilization.

Many management practices are used to intentionally alter the moisture content of grain. Harvest is delayed to allow grain to field dry. Harvest is also delayed until grain moisture content is increased by humidity or dew in order to reduce field losses.

Damp grain is usually dried before storage. Heavy aeration (over  $0.08 \text{ m}^3/\text{min}\cdot\text{m}^2$ ) systems are used for moisture removal. Even light aeration (under  $0.08 \text{ m}^3/\text{min}\cdot\text{m}^2$ ) systems, used to cool grain and equalize temperatures within grain masses, remove moisture in the process. Aeration is also used to increase grain moisture during periods of high humidity. Grain handlers routinely blend grain lots with different moisture contents to achieve a desired composite moisture content.

## OBJECTIVES

The purpose of this study was to determine the practicality and limitations of raising the moisture content of very dry wheat to near the appropriate market standards through the addition of water in liquid form.

Specific objectives were:

- 1 to determine the maximum amount of water that could be added to wheat in this manner,
- 2 to determine the response of electronic moisture testers to wheat with water added,
- 3 to check for incipient germination in wheat with

water added, and

4 to compare large volume field studies with small sample laboratory tests.

## REVIEW OF LITERATURE

Wheat tempering is a standard step in the wheat milling process. Optimum milling performance (i.e., maximum flour yield with minimal bran contamination) is achieved by adding moisture to the wheat and then allowing it to set for some time before milling. Butcher and Stenvert (1973) report that hard wheats are generally tempered to 15.5 to 17 percent moisture content and soft wheats to 14 to 15.5 percent moisture content. Wheat tempering has two objectives: the endosperm should be friable and readily reduced while the bran should remain tough. At high moisture levels the endosperm is less friable while at low moisture the bran becomes brittle. Optimum milling is achieved when there is a moisture gradient within the kernel with the bran at a higher moisture than the endosperm.

The mechanisms for moisture distribution throughout the kernels and the time required for even distribution have been studied by several researchers. Jones and Campbell (1953) reported that at least 24 h were required before added water became evenly distributed in Canadian Manitoba wheat. At  $20^\circ\text{C}$ , the center of the endosperm of vitreous Manitoba grain had received about half its 5 percent final moisture increase in 5 h and about 85 percent in 24 h. The moisture movement to this part of the grain was not complete until about 60 h.

Hinton (1955) found the slow water movement in the endosperm was responsible for the long period required for the complete distribution of water throughout the kernel. The permeability of the endosperm was influenced mainly by the degree of mealliness it had developed. Hinton (1955) found the effective barrier to ready entry of water to be the testa rather than the hyaline layer as reported by others. The practical significance of the testa's resistance is that it limits the water absorbed by wheat during washing to that which can be absorbed by the pericarp.

Grosh and Milner (1959) offer evidence that cracks are initiated in wheat by the tempering process and that moisture movement into the endosperm is enhanced by these cracks. This finding suggests that middlings may be performed in the tempering process. The cracking phenomenon was significant only in vitreous wheats and then only for kernels wetted to moisture contents above 13 percent.

Samples of four wheat classes were wetted to 17 percent moisture content by Grosh and Milner (1959), who 8 h later, found a relatively even moisture distribution throughout the kernels. The length of time required by the samples to reach maximum softness ranged from 4 h for Durum wheat to 12 h for Ponca hard red winter wheat.

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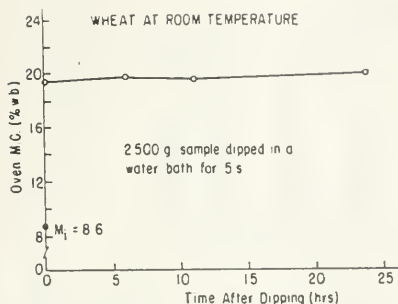


FIG. 1 Moisture content increase resulting from dipping wheat in water.

Becker (1960) studied absorption of water by wheat kernels. He found that the very rapid initial absorption into the pericarp decreases with increasing temperature while diffusion within the kernels increases with increasing temperature. Campbell and Jones (1957) recorded a threefold rise in the rate of moisture penetration into Manitoba wheat when the temperature was raised from 20 °C to 43.5 °C. Moisture movement was 85 percent complete after 2.6 h at the higher temperature.

Stenvert and Kingswood (1976) used autoradiographic methods to study the movement of water into the bran, germ and starchy endosperm of wheat. Later (1977), they determined the factors influencing the rate of moisture penetration. Endosperm structure influenced the rate of moisture penetration most with protein content being less important. The more ordered the endosperm structure became, the slower the rate of moisture movement. The time required to reach an even distribution of moisture in the kernels ranged from 6 to over 24 h.

#### LABORATORY TESTS PROCEDURES AND RESULTS

A series of laboratory experiments were conducted to investigate several aspects of moisture absorption by wheat. In these tests grain moisture content\* was determined by one or more of several methods. A forced-draft oven was used with drying time and temperature according to ASAE Standard S 352. Three electronic moisture testers were also used — a Burrows Model 700 digital moisture computer, a Steinlite Model 400G, and a Dickey-john portable grain moisture tester. The wheat used in the experiments was a hard red winter variety.

##### Maximum Surface Moisture for Wheat

A test was conducted at room temperature to determine the maximum amount of water that wheat can hold on its surface. A 2.5 kg sample was dipped in a water bath for 5 s, withdrawn and allowed to drain in a household strainer for 5 s. The surface-wetted wheat was stored in a closed plastic container. Samples were taken initially and at 6, 11, and 24 h for moisture content determination by the oven method. As shown in Fig. 1, wheat initially at 8.6 percent moisture content, held suf-

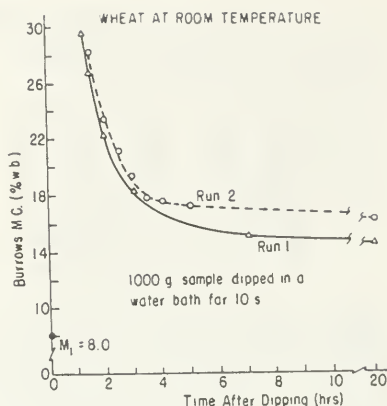


FIG. 2 Electronic moisture tester response when wheat is dipped in water.

ficient moisture on its surface to increase moisture content by more than 11 percentage points. The moisture content, as determined by the oven method, did not change during the 24 h test period.

##### Electronic Moisture Tester Response with Time

An experiment involving wheat dipped in water was conducted to observe the response of an electronic moisture tester to surface-wetted grain. A 1 kg sample of wheat was dipped for 10 s, drained and stored in a closed plastic container. Samples were taken at intervals up to 20 h for testing in a Burrows Model 700 digital moisture computer. Both wheat and water were initially at room temperature and the wetted samples were stored at room temperature. Results of two test runs are shown in Fig. 2.

The Burrows machine indicated very high moisture contents immediately after surface wetting of the wheat. Indicated moisture content decreased rapidly as the moisture was absorbed into the wheat until about 4 h after dipping. At this time, indicated moisture content was within 1 percentage point of its value at 20 h after dipping.

In run 1, about 7 percentage points of moisture were added in a single dipping while in run 2, about 9 percentage points were added. These values were obtained by subtracting the initial moisture content as determined by the oven method from the wetted moisture content as indicated by the Burrows machine.

##### Long-Term Moisture Stability and Moisture Tester Comparison

Approximately 25 kg of room temperature wheat were well mixed with room temperature water and then divided into ten approximately equal portions. Each portion was stored in a closed plastic container in a temperature controlled chamber maintained at 18 °C. At intervals up to 31 days, moisture determinations were made on nine or ten 250 g samples of wheat from a single container.

\*Moisture content was determined on a wet basis.

TABLE 1. COMPARISONS OF MOISTURE TESTING DEVICES AT VARIOUS TIMES AFTER MIXING WATER WITH WHEAT

Time	Oven*		Burrows		Dickey-John		Steinlite	
	$\bar{x}$ <sup>†</sup>	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
	%	%	%	%	%	%	%	%
2.5 h	13.05	0.059	12.44	0.052	13.07	0.103	12.36	0.117
5 h	13.01	0.024	11.90	0.087	12.38	0.238	11.93	0.104
24 h	13.11	0.029	11.86	0.097	12.51	0.194	11.94	0.151
3 days	13.07	0.016	11.93	0.050	12.72	0.151	11.79	0.099
6 days	13.03	0.038	11.93	0.048	12.71	0.145	11.83	0.109
17 days	13.03	0.026	11.93	0.087	13.08	0.140	11.92	0.202
31 days	13.00	0.028	11.76	0.053	12.54	0.159	11.59	0.098
63 days	12.70	0.033	11.50	0.071	11.86	0.389	11.43	0.162
76 days	12.80	0.029	11.68	0.044	12.19	0.255	11.53	0.141
103 days	12.73	0.030	11.41	0.060	11.55	0.320	11.42	0.117

\*Initial moisture content was 8.56 percent.

†Means and standard deviations of moisture content result from either nine or ten samples.

Each sample was run on each of the moisture testers and then placed in the oven.

The results in Table 1 show that within 5 h, the moisture content values indicated by each of the moisture testers had stopped falling. Over time, the indicated moisture contents of the three moisture testers fluctuated more than did actual moisture content as determined by the oven method. In addition, the oven method resulted in the lowest standard deviations as shown in Table 1. Of the moisture testers, the Burrows machine had the lowest standard deviations, followed by the Steinlite and then the Dickey-John tester. The amount of moisture added was 4.5 percentage points as determined by the oven method.

#### Effect of Wheat Temperature

An experiment was conducted to observe the effect of wheat temperature on moisture tester response when water is mixed with wheat. Water at room temperature was sprayed on wheat at 7 °C and 24 °C entering an auger which provided mixing. Following wetting, the containers of wheat were held at 7 °C and 24 °C, respectively, and periodically sampled for moisture content using the Burrows moisture tester. The cold samples were allowed to warm to room temperature in a sealed container before testing.

For wheat at room temperature (24 °C), the indicated moisture content fell rapidly until 3 h after wetting, at which time its indicated moisture content was within 1 percentage point of the indicated moisture content after 24 h. For wheat at 7 °C, the indicated moisture content was still dropping rapidly at 3 h. This appears to indicate that moisture is absorbed more slowly in the cold wheat.

A series of four tests involved spraying cold water (0 °C to 7 °C) on cold wheat (0 °C to 7 °C) as the wheat flowed from a bin in a walk-in cooler. The wetted samples were further mixed by stirring and then stored in closed containers in the cooler. Single samples were drawn at intervals up to 24 h for moisture determinations using the Steinlite moisture tester. All samples were allowed to warm to room temperature in a sealed container before moisture testing.

Several factors are important in interpreting Fig. 3. The single moisture content determinations result in considerable scatter. Each of the tests had a different initial moisture content and different amounts of water were added in each test. Also, there was considerable discrepancy between the oven method moisture content and

that indicated by the Steinlite tester as shown by the 24-h values.

In spite of these shortcomings, it is apparent from Fig. 3 that cold wheat requires much longer than room temperature wheat before indicated moisture content becomes stable. From 12 to 18 h were required before indicated moisture content fell to within 1 percentage point of the indicated moisture content at 24 h. The curves for 0 °C and 2 °C wheat have greater slope during the period from 4 to 12 h than the curves for 7 °C wheat. The wheat with the smallest moisture increase appears to give a stable indicated moisture content sooner than the tests involving the addition of greater amounts of moisture.

#### Effects of the Amount of Moisture Added

Three 2 kg samples of room temperature wheat were sprayed at three different water application rates with room temperature water. The samples were mixed by stirring and covered with a tarpaulin between samplings at 2, 2.5 and 3 h. Moisture content readings were obtained using the Burrows moisture tester and by the oven method. Results are shown in Fig. 4. Each plotted point is the result of four determinations.

Each of the three tests involved a different initial moisture content. In addition, the Burrows meter reads consistently below the oven. Both these factors are removed from Fig. 4 by plotting moisture content as Burrows minus oven.

It appears that the indicated moisture content would

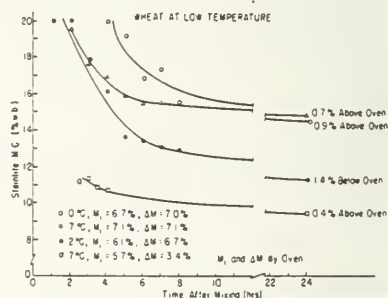


FIG. 3 Effect of wheat temperature on moisture tester response when wheat is mixed with water.

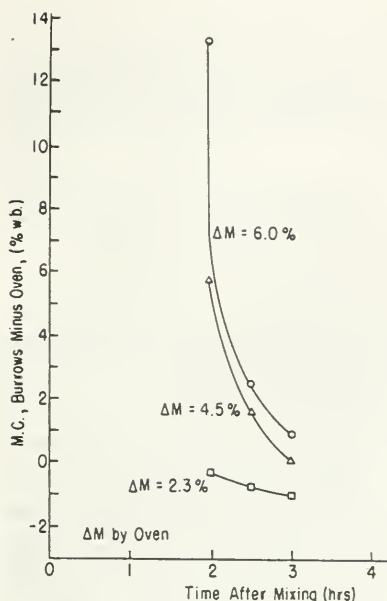


FIG. 4 Effect of the amount of water added to wheat at room temperature on moisture tester response.

have stabilized at 1 to 1.5 percent below the true moisture content as determined by the oven method. The time required for the indicated moisture content to fall to within 1 percentage point of its stabilized value varies from about 2 h for 2.3 percentage points of added moisture to 4 h or more hours for 6.0 percentage points of added moisture.

#### Test for Incipient Germination

It is well established that sound mature wheat contains substantial amount of the amylolytic enzyme,  $\beta$  — amylase, as described by French (1960) while no detectable quantity of a second starch-digesting enzyme,  $\alpha$  — amylase, can be demonstrated. During the process of germination of the wheat kernel, synthesis of  $\alpha$  — amylase begins about 3 to 4 days after the initial soaking of the kernels and continues during the growth of the young rootlets and shoot as described by Abbott and Daussant (1969). At the same time, additional amounts of  $\beta$  — amylase are released from the "bound" state in the kernels with a resulting apparent increase in  $\beta$  — amylase activity in the germinating grain. The fact that  $\alpha$  — amylase synthesis and activity is closely associated with the germination process was used as a means of testing for incipient germination.

A simple experiment was conducted to evaluate the effects of different moisture levels in wheat on the development of  $\alpha$  — amylase. About 2.5 kg of dry yeast (9.5

percent moisture content) was divided into 12 sub-samples. Pairs of these samples were adjusted to 12.5, 13.5, 14.5, 15.5, 20.0 percent moisture content by addition of water followed by 1 h agitation to insure even distribution of the water. The 9.5 percent moisture samples were the control samples. These samples were held in screw-top jars for 16 days. In order to prevent oxygen depletion during the 16 day storage period, each sample was transferred out of and back into its jar at 2 day intervals. At intervals of 2 to 6 days during the storage period each jar was subsampled by removal of about 15 g of wheat. Moisture content of the subsamples were determined immediately and the grain was air dried overnight to reduce its moisture content to about 10 percent. The samples were then ground and held at room temperature until tested for amylase activity.

Amylase activity was evaluated by application of aqueous extracts of the samples to small wells cut into agar gels followed by application of a soluble-starch substrate to the gels. After allowing enzymatic activity to proceed for 1 h, the substrate was washed off and an iodine/potassium iodide reagent was added to stop the reaction and to stain undigested starch which had diffused into the gel.

Amylolytic activity was evidenced by the appearance of a clear concentric zone around the well. The size of the zone gave a rough indication of the amount of enzyme present. For comparative purposes an extract of malted wheat flour (MWF) known to contain high levels of  $\alpha$  — amylase was included in each assay.

Although the appearance of a clear zone around the well indicated amylase activity, it did not distinguish between  $\alpha$  — and  $\beta$  — amylase. The known inactivation of  $\beta$  — amylase by low levels of mercuric chloride ( $\text{HgCl}_2$ ) or by heat as compared to the relative insensitivity of  $\alpha$  — amylase to the same treatments was used to make this distinction. In addition to the series of untreated extracts, a second series used extracts treated with  $\text{HgCl}_2$  while a third used extracts heated at 70 °C for 15 min. Extracts tested were those stored 3 days and 16 days at each of the moisture levels.

In the untreated extracts from both 3-day and 16-day storage and at all moisture levels, a small clear zone around the application well appeared. This result indicated the presence of some amylolytic activity. The MWF extract exhibited a clear area about four times the size of the others. The size of the clear zones was identical for all moisture levels at both storage times. When the same test was applied to extracts in which  $\beta$  — amylase had been inactivated by either  $\text{HgCl}_2$  or heat, there was no evidence of any amylolytic activity in any of the extracts except that of MWF. The size of the MWF clear zone was reduced somewhat which indicated that part of its total activity could be attributed to  $\beta$  — amylase.

It is clear that under the storage conditions used in this experiment there was no development of  $\alpha$  — amylase activity even after 16 days storage at 20 percent moisture content. No evidence of mold development was seen in samples used in this experiment. Mold development depends on the initial inoculum in the grain as well as the final moisture levels.

#### FIELD STUDIES

Two semi-truck loads of wheat were loaded on a hot

August afternoon from a 160 t (6,000 bu) bin equipped with a grain stirring device which had been operated for 2 days. Prior to withdrawing grain from the bin several samples of wheat when checked with the Dickey-john grain moisture tester indicated a moisture content of 8.0 percent.

From the bin, a 150 mm (6-in.) diameter unloading auger fed the wheat into a 200 mm (8-in.) diameter, 20 m (60 ft) long transport auger used to load the trucks. The unloading auger delivered 2,263 kg (4,990 lb) of wheat in a 5 min test run. This rate is 27,160 kg/h (998 bu/h). A hose was used to add water where the unloading auger emptied into the transport auger. The water system was calibrated over its full range of operating pressure. Water flow was set at 0.39 kg/s (6.2 gal/min) in order to add 4.5 percentage points of moisture to the measured grain flow rate.

The wheat appeared very wet (shiny) as it exited the transport auger, and its angle of repose was steep. Within 1 h the grain had returned to the normal appearance and angle of repose of dry grain.

During the loading of the two trucks, 22 samples of about 250 g (0.5 lb) size were taken at the discharge end of the transport auger. When these samples were oven dried, they produced a mean moisture content of 12.48 percent with a standard deviation of 0.12 percent.

Upon delivery the next morning the two loads were determined to have 12.6 and 12.3 percent moisture content with test weights of 1,136 and 1,130 kg/m<sup>3</sup> (56.8 and 56.5 lb/bu). Both loads were graded No. 2 and discounted 2.5 cents/bu for low test weight.

Two more semi-truck loads were loaded from the same bin on a warm afternoon in September for delivery to market on the following morning. The auger flow rate was assumed to still be 27,160 kg/h (998 bu/h). Since two 27 t (1,000 bu) loads were desired, each truck was loaded for 60 min.

On-site moisture determinations were again made with the Dickey-john grain moisture tester. During loading of the first truck the dry wheat moisture content (as indicated by the Dickey-john) increased from about 8 to about 9 percent. Water flow rate was adjusted in an effort to maintain the desired moisture content of 12.5 percent.

Oven drying of moisture samples taken during the loading of the first truck confirmed a change in dry wheat moisture content of 8.10 percent at the beginning of loading to 8.70 percent at the end. Oven dried samples of wheat from the truck were an average of 12.98 percent with a standard deviation of 0.14 percent.

During loading of the second truck, indicated moisture content of the dry wheat continued to rise to about 9.5 percent. Again, appropriate reductions in water flow rate were made. Oven drying of 14 samples taken during loading of this truck revealed an increase of dry wheat moisture content to 9.6 percent and a mean moisture content of the load of 12.93 percent with a standard deviation of 0.27 percent.

Upon delivery to the elevator for sale on the following morning, the two loads were determined to have 12.6 and 12.7 percent moisture content, respectively. Both graded No. 2 due to low test weight. Total grain weight contained in each load was just 24 t (900 bu). Therefore, the auger flow rate had decreased about 10 percent from its initial determination. Either the auger flow decreased as

grain was removed from the bin or some change was made between the two loading dates that affected auger capacity. This explains why the grain moisture content was 0.4 and 0.5 percentage points higher than the 12.5 percent target. Had the water flow rate not been adjusted during loading we would have expected greater variations in the moisture content of samples taken from the truck.

## CONCLUSIONS

- 1 The amount of water that can be uniformly applied to the surface of wheat at 20 °C or above is greater than the amount commonly needed to bring dry wheat up to the market standard moisture content.

- 2 True moisture content, as determined by oven drying, does not change with time after water has been mixed with grain.

- 3 The time response of electronic moisture testers to wheat that has been mixed with water is a function of grain temperature and the amount of water added. Additional independent variables may be the initial moisture content and the moisture tester.

- 4 Indicated moisture content as determined by electronic moisture testers reads high initially and approaches true moisture content as moisture is absorbed into and distributed within the kernels.

- 5 At low grain temperatures and/or when larger amounts of water are added, longer waiting periods are required before indicated moisture content approaches true moisture content. Warm wheat absorbing 2 percentage points may require less than 1 h while wheat with temperature near freezing absorbing several percentage points may require as much as 24 h.

- 6 Raising the moisture content of dry wheat to 13 percent by uniform addition of water will not lead to germination damage.

- 7 Moisture can be uniformly added to grain using a procedure that matches grain and water flow rates and uses a transport auger for mixing.

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January 5, 1982

Mr. Mervin Shumate  
 Food and Drug Administration  
 Room 1505  
 Park Lawn Building  
 5600 Fishers Lane  
 Rockville, Maryland 20852

Dear Mr. Shumate:

I appreciate the time that you and your staff spent with me and with Professor Shove in mid December. The discussion was very valuable in terms of a better understanding of the basis for the FDA ruling on economic adulteration of grain. It was also helpful in terms of understanding the position in which the FDA has been placed by the pressures from the two groups involved.

I am convinced that changing the standards is the best way to solve the problem, but with strong opposition from the grain industry there is little chance of success. Your position on blending gives me an idea for altering the industry attitude. If the present standards put the grain merchandisers practices in conflict with the FDA ruling, then merchandisers as well as farmers stand to benefit from an improved system of grain grades and standards.

To use this information effectively with the industry, I need a clear statement of the Food and Drug Administration's position. I would use your statements with discretion but I could be much more effective in some of my public meetings if I had in writing a decision on specific examples. Could you therefore provide a concise answer to the following questions, in a form that you would be willing for me to use in public meetings and published reports? In some cases the answer may simply be that you would consider that to be adulteration or illegal. If you wish to elaborate or feel it necessary to elaborate on any of the examples I give, please to not hesitate to do so.

1. A farmer or elevator manager uses any device to uniformly add pure water to overdried grain to bring it up to the maximum moisture allowed by the grain standards.

2. A farmer or elevator manager takes 25% moisture corn and blends it with 12% moisture corn in order to reach the maximum allowable average moisture of 15.5%.

3. A farmer or elevator manager blends 25% moisture corn with 11% moisture corn in order to bring the average moisture down to a safe storage level.

4. The farmer or elevator manager operates his aeration fans on a bin of 14% moisture corn in order to raise the moisture to 15.5%.



Mr. Shumate  
January 4, 1982  
Page 2

5. The farmer or elevator manager uses his aeration fan on 14% moisture corn for the purpose of reducing the temperature of the grain for safe long term storage. In the process, changing humidity conditions of the ambient air result in an increase of moisture on some days and a decrease of moisture on others.

6. The farmer or elevator mixes (blends) 15% moisture corn with 16% moisture corn in order to arrive at a 15.5% average.

7. An elevator offers a premium for high moisture corn with an implied intent of blending it with over dried corn being delivered by farmers.

8. A farmer or an elevator manager removes screenings from corn with high FM and returns these screenings under controlled conditions to the maximum allowed by the grade limit.

9. The elevator uses excess screenings taken from Monday's deliveries and blends them with Tuesday's receipts in order to bring that corn up to its maximum FM of 3% for loading a unit train sold on a No. 2 contract.

10. An elevator receives a load of 15% BCFM corn from a farmer and mixes it with existing supplies of corn with 2% FM in order to obtain corn for loading on a contract requiring 3% BCFM.

I realize I have made a very long list of situations and some of them may be such that you are unable to give a ruling at this time. However, I think that these kinds of specifics are essential to demonstrating to the grain industry the dilemma that is created by a set of standards that were developed in the early 1900s with no consideration of the current production and marketing technologies. I would appreciate receiving a response from you at your earliest convenience.

Sincerely,

Lowell Hill

LH:ms

# Grain picks up weight from moisture

ST. PAUL, MINN., Aug. 9. — Research just completed at the University of Minnesota indicates that, contrary to most beliefs, the moisture content and weight of a given mass of grain "can fluctuate measurably within relatively short periods of time."

The study, conducted under both laboratory and field conditions, measures the effect on weight of a given amount of various grains when exposed to air of relative humidity higher than that with which the grain was in equilibrium at the time of loading.

"Gain in Weight of Grains and Grain Products Exposed to Relative Humidities of 80-90%" is the title of the study conducted by C. M. Christensen, Department of Plant Pathology, University of Minnesota, and H. H. Kaufmann, A. Hawk and F. Wade of Cargill, Inc. The study, University of Minnesota Agriculture Experiment Station, Miscellaneous Journal, Series No. 1632, follows, in part:

EVERYONE at all familiar with grain and grain products knows that they will gain or lose moisture, and therefore weight, when they are exposed to air of relative humidity higher or lower than that with which they are in equilibrium at the time, but there is little information on the rate of such gain or loss. The tests here described were undertaken to determine the rate and magnitude of gain in weight of commercial samples of wheat, corn, and soybean meal exposed to relative humidities of 80-90%, as they frequently are during transfer at Houston, Texas, and Baton Rouge and New Orleans, La.

In the laboratory, samples of 200, 400, and 500 grams were exposed, either on a plastic box lid 15 cm wide and 30 cm long (6x12 in.), or in a balance scoop 18 cm wide, 30 cm long, and 6 cm deep (7x12x2.5 in.). Two hundred grams made a layer about one cm deep in the center, on the plastic box cover, and 400 grams made a layer about two to three cm deep. The 500 gram sample in the balance scoop had approximately the same surface-depth ratio as grain on a transfer belt. The samples were exposed in a climate chamber in which the relative humidity was maintained at 85-90%,

temperature at 30 C (86 F).

The air in the chamber was circulated gently by means of a fan. When the chamber door was opened to insert the sample, the relative humidity dropped to about 75%; timing of each exposure period began when the relative humidity reached 80%.

## Outdoor tests of Baton Rouge

Field or outdoor tests were made at the Cargill, Inc., elevator in Baton Rouge. These tests involved grade No. 2 yellow dent corn that had recently arrived via unit train from Illinois. It had a moisture content of 14.0 - 15.0%. One portion of the corn had been kept for several days in a closed container at ambient temperature, about 25 - 30 C (78 - 87 F); another portion was stored at 8 - 10 C (45 - 50 F) until test samples were weighed out for exposure, the aim being to simulate conditions that very often prevail in the spring.

Portions of 500 grams were exposed either on plastic covers, as described above, or in baskets 7.5 x 12.5 x 12.5 cm (3 x 5 x 5 in.) in size, made out of window screening, on a table just outside the door of a large metal storage tank. Weighing was done on balances on a table just within the door of the tank, to avoid air movement that made accurate weighing out of doors impossible. The samples were exposed between 12:30 and 5:30 a.m. on July 23, 1976. The temperature was approximately 20 C (68 F); relative humidity between 80 and 85%.

The results of the laboratory tests are given in Figures 1 - 4 below and in Table 1. The results of the tests at the elevator are summarized in Tables 2, 3 and 4. (See page 91.)

## Surface related to volume

The samples of wheat of 200 grams (Fig. 1, 2) gained weight faster than the sample of 400 grams (Fig. 3) presumably because of the greater surface in relation to the volume. The sample of soybean meal of 200 grams (Fig. 4) gained weight at almost double the rate of the samples of wheat of 200 grams, presumably because of the greater surface exposed in the finely divided meal. Corn with an

initial moisture content of 13.47% gained weight at almost exactly the same rate as soybean meal with an initial moisture content of 11.2%, and as wheat with initial moisture contents of 9.70 and 11.70% (Table 1.)

In the samples exposed at Baton Rouge, those initially 90% 14.5 - 15.0% moisture and at 8 - 10 C gained an average of 0.29% in weight in 5 minutes, 0.37% in 20 minutes, 0.48% in 40 minutes 0.58% in 60 minutes, and 0.65% in 80 minutes (Table 2.) The samples initially at ambient temperature and exposed on plastic covers gained weight more slowly, but in 60 minutes gained an average of more than 0.1% and in 90 minutes more than 0.2% (Table 3.) Those initially at ambient temperature and exposed in wire baskets (Table 4) gained very little weight in the first two hours of exposure, presumably because of the relatively small surface exposed and the lack of moving air.

According to U.S. Department of Commerce climatological data over a period of 12 years (1962-73) the average relative humidity at Baton Rouge at midnight and at 8:00 a.m. has ranged between 78 and 92% every month of the year.

## Significant amount of pickup

A given elevator located in one of the southern ports where a high relative humidity prevails through many months of the year may, over a period of years, transfer hundreds of millions of bushels of grain that originated in the northern states, some of it with a low temperature as well as a low moisture content as it arrives. A gain of 0.2% in 100,000,000 bus is 200,000 bus, a significant amount.

It has been more or less tacitly assumed, in grain merchandising, that weight of a grain parcel of grain, or of a given volume of grain, is exceedingly constant, and that if any discrepancy occurs in the amount loaded into and out of an elevator, it must be due to faulty scales or faulty practices. The data from our tests suggest that these assumptions may be false, and that moisture content and weight can fluctuate measurably within relatively short periods of time. (OVER)



Figure 1

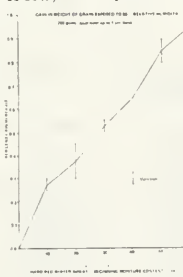


Figure 2

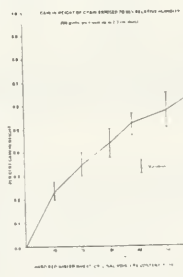


Figure 3



Figure 4

Reprinted from the August 10, 1976 issue of *Milling & Baking News*.

# Detailed data on grain weight

ST. PAUL, MINN, Aug. 9.—Following are the four tables accompanying the University of Minnesota study (see

Page 14) on "Gain in Weight of Grains and Grain Products Exposed to Relative Humidities of 80-90%":

Table 1. Gain in weight of 500-gram samples of corn, wheat, soybean meal and alfalfa pellets exposed for successive 20-minute periods to a relative humidity of 85-90%, at 30 C. (1).

Sample	Beginning Moisture %	Gain in Weight After			minutes
		20	40	60	
Corn .....	13.47	0.17	0.19	0.28	
White wheat .....	11.70	0.13	0.20	0.27	
H.R.W. wheat .....	9.70	0.07	0.22	0.25	
Soybean meal .....	11.2	0.15	0.22	0.27	
Alfalfa pellets .....	8.5	0.16	0.36	0.38	

(1) Each figure is an average of two or three replicate trials.

Table 2. Gain in weight of 500-gram samples of grade No. 2 yellow corn, initially of 14.0-15.0% moisture, and temperature of 8-10°C., exposed to air of 80-95% relative humidity at Baton Rouge, La.

Sample No.	Gain in weight after						minutes
	1 %	2 %	5 %	20 %	40 %	60 %	
1 .....	0.24	0.34	0.28	0.38	0.50	0.58	0.62
2 .....		0.22	0.22	0.38	0.48	0.60	0.68
3 .....			0.28	0.38	0.48	0.60	0.68
4 .....			0.30	0.38	0.52	0.64	0.70
5 .....			0.32	0.38	0.46	0.58	0.66
6 .....				0.32	0.44	0.50	0.60

Avg. .... 0.24    0.28    0.29    0.37    0.48    0.58    0.65

Table 3. Gain in weight of 500-gram samples of grade No. 2 yellow corn, initially of 14.5-15.0% moisture and ambient temperature, exposed to air of 80-85% relative humidity at Baton Rouge, La. Exposed in plastic box covers.

Sample	Gain in weight after						minutes
	20 %	40 %	60 %	90 %	120 %	210 %	
1. ....	-0.04	0.00	0.08	0.20	0.26	0.60	
2. ....	0.04	0.08	0.14	0.28	0.32	0.72	
3. ....	-0.02	0.02	0.08	0.22	0.26	0.66	
4. ....	0.02	0.08	0.12	0.22	0.30	0.64	
5. ....	-0.02	0.00	0.08	0.18	0.26	0.64	
6. ....	-0.02	0.06	0.10	0.22	0.32	0.62	
7. ....	0.00	0.04	0.14	0.22	0.28	0.64	
8. ....	0.04	0.08	0.14	0.22	0.30	0.70	
9. ....	0.04	0.10	0.19	0.24	0.36	0.72	
10. ....	-0.02	0.08	0.12	0.20	0.30	0.74	
Avg. ....	0.002	0.048	0.119	0.22	0.296	0.668	

Table 4. Gain in weight of 500-gram samples of No. 2 yellow corn, initially of 14.5-15.0% moisture and ambient temperature, exposed to air of 80-85% relative humidity at Baton Rouge, La. Exposed in screen baskets.

Sample	2 hr %	Gain in weight after	
		3 hr %	3 hr, 40 min. %
1. ....	0.09	0.18	0.26
2. ....	0.09	0.24	0.38
3. ....	0.09	0.22	0.32
4. ....	0.09	0.20	0.30
5. ....	0.10	0.22	0.28
6. ....	0.08	0.28	0.40
7. ....	0.10	0.30	0.42
8. ....	0.08	0.40	0.34
9. ....	0.10	0.24	0.28
10. ....	0.08	0.18	0.26
Avg. ....	0.087	0.23	0.324

A GRAIN INDUSTRY SOLUTION TO THE REWETTING PROBLEM

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AE-4594  
April 1985

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## A Grain Industry Solution to the Rewetting Problem

Lowell D. Hill and Robert Spangler\*

Dramatic changes in grain prices, marketing margins, and technology create problems for managers of country elevators. A recent survey of Illinois elevators demonstrate that some managers turn these problems into opportunities. Extreme fluctuations in harvest moisture and market prices during the 1960's caused financial problems for elevators who were using the traditional moisture discount of cents per bushel per point of moisture above 15.5. Under a fixed discount schedule elevator profits from drying may be positive or negative depending on prices and moisture content of the corn being delivered. It was extremely difficult to change a discount schedule rapidly enough to maintain constant returns to drying when prices and moisture levels of the 1960's were changing from one day to the next. In 1967 nearly all Illinois elevators were using either a fixed cents per bushel per point or a graduated scale with fixed increments (Table 1). Faced

Table 1. Percentage of Elevators Using Different Moisture Discounts, 1967, 1974, 1981, 1982, and 1985

<u>Discount Procedure</u>	<u>1967</u>	<u>1974</u>	<u>1981</u> (percent)	<u>1982</u>	<u>1985</u>
c/bu/pt	56.6	37.6	41.3	42.1	38.0
% of price/bu/pt	0.0	29.8	7.7	3.2	11.0
Shrink + drying charge	9.1	32.6	49.0	54.7	51.0
Other procedures	34.3	0.0	2.0	0.0	0.0
No. responding	180	141	100	95	100

Sources: 1967 and 1974 data were obtained from mail surveys. 1981 and 1985 data were obtained from a telephone survey. 1982 data were obtained from a mail survey with a telephone follow-up with non-respondents.

with uncertain returns using the fixed discount schedule Illinois elevators responded with a new approach to handling moisture discounts. By 1974 nearly 30 percent of the Illinois elevators surveyed were using a percent of price as a basis for setting the discount and another one-third of the managers had adopted a shrink plus drying charge approach. Both of these techniques automatically adjust for differences in price levels but the shrink plus drying charge more accurately identifies the value of corn and water, the cost of drying, and loss of value due to shrink resulting from moisture reduction.

\*Lowell D. Hill is L. J. Norton Professor and Robert Spangler is an undergraduate assistant in the Department of Agricultural Economics, University of Illinois at Urbana-Champaign.



The shrink plus drying charge continued to gain in popularity and by 1985 over half of the elevators were using a shrink plus drying charge and another 11 percent were calculating discount as a percent of price.

A recent survey of a random selection of 100 Illinois elevators provided information on their pricing and discount practices. The sample was selected from the Annual Directory of the Grain and Feed Association of Illinois. The average size of the 100 facilities was 2.1 million bushel storage capacity with a range from 30,000 bushels to 18.8 million bushels. A telephone survey obtained information on three general problem areas for many managers.

1. Adjusting price or quantity for excess moisture in the corn being delivered and the shrink factors and discounts in most general use.
2. Discounts for low test weight and any adjustments made to account for the influence of moisture on test weight.
3. Pricing strategies being used to discourage farmers from adding water to grain before delivery in order to obtain full value for the dry matter in their corn.

The responses to this survey indicate the ability of many elevator managers to turn problems into opportunities.

#### Moisture Discounts

Thirty-eight percent of the elevators in the survey reported that they were using a price discount to adjust for excess moisture (Table 2). The average discount was 6.1 cents per bushel per point for each point of moisture above 15.5. Eleven percent of the elevators were using a percent of price as an adjustment procedure. The average of 2.3 percent is equivalent to 6 cents per bushel per point at a corn price of \$2.60. Fifty-one percent of the elevators were using a shrink factor plus a drying charge. The average shrink factor for those elevators was 1.37 percent per point of moisture removed and the average drying charge was 2.55 cents per bushel per point. At a corn price of \$2.60 per bushel this is equivalent to a discount of 6.1 cents per bushel per point. All three methods achieved essentially the same result but the shrink factor plus drying charge generates a stable drying charge per point regardless of changes in price of corn or moisture content. It also gives farmers a known charge for drying such that they may evaluate their alternatives in terms of on-farm drying cost versus drying charges at the elevator.

The use of averages conceals the variation in discounts among elevators. A manager may be more interested in the number of competitors using similar or different discount schedules than in the average of all elevators. Table 3 shows the percent of respondents reporting each level of discount during the January 1985 survey. In order to compare discounts for moisture among the three methods the total discount was calculated using a corn price of \$2.50 and a moisture level of 20.5 percent. The effective discount per bushel varied from a low of 12 cents to a high of 40 cents among the elevators responding.

Table 2. Methods Used by Illinois Elevators for Adjusting for Excess Moisture, 1985

	<u>Cents per Bushel Per Point</u>	<u>Percent of Price</u>	<u>Shrink Factor Plus Drying Charge</u>
Percent of elevators	38	11	51
Ave. storage capacity (millions of bushels)	1.3	1.9	2.8
Ave. discount	6.1¢/bu/pt	2.3%	--
Ave. shrink (%)	--	--	1.37
Ave. drying charge (¢/bu/pt)	--	--	2.55

Table 3. Frequency of Discount Rates used by Illinois Elevators for Three Methods of Adjusting for Excess Moisture in Corn, 1985

<u>Discounts<sup>1</sup> (cents/bu)</u>	<u>Percent of Elevators Using Various Discounts</u>			<u>All Method</u>
	<u>cents- per-point</u>	<u>% of Price</u>	<u>Shrink plus Drying Charge</u>	
12-15	2.6	0.0	0.0	3.2
16-20	0.0	18.2	2.0	5.2
21-25	2.6	9.1	7.8	6.0
26-30	81.6	9.1	60.8	59.4
31-35	7.9	63.6	19.6	20.2
36-40	5.3	0.0	9.8	6.0
No. responding	38	11	51	100
Ave. Discount (¢/bu)	27.2	29.3	29.4	

<sup>1</sup>Based on a corn price of \$2.50 and 20.5 percent moisture corn.

Eighty-one percent of the elevators using a cents per point discount, reported effective discounts between 26 and 30 cents per bushel at 20.5 percent moisture corn; 2.6 percent of the elevators reported discounts in the 12 to 15 cent per bushel range. The lowest was 1.3 cents per bushel per point. The range in discount per point was from a low of 2.6 cents per bushel per point to a high of 8 cents per bushel per point. Elevators with price discounts below 15 cents for 5 points are not covering their cost of drying since the value of shrink incurred during drying is 14.8 cents per bushel when price of corn is \$2.50. At higher corn prices the moisture discount would have to be above 15 cents per bushel just to cover the value of shrink during drying from 20.5 to 15.5 percent moisture. The average discount was lower for those elevators using a cents per point method (27.2 cents) than for elevators using the percent of price or shrink plus drying charge (29.3 and 29.4 cents respectively). Two-thirds of the elevators using a percent of price discount reported discounts between 31 and 35 cents per bushel. Over 80 percent of the elevators using a shrink plus drying charge had effective discounts between 26 and 35 cents. The most frequently reported shrink factor was 1.4 percent per bushel per point; the most common drying charge was 2.0 cents per bushel per point. The highest shrink factor reported by any elevator in the survey was 1.7 cents per bushel per point.

The use of test weight discounts appears to vary with the season and whether test weight is a major problem for the elevators in their out-bound shipments. In 1984 harvest the test weight was generally high and 45 percent of the elevators surveyed said they did not use a test weight discount. Of the remaining 55 elevators that discounted for test weight, 14 reported they were adjusting the test weight discounts when moisture content of the corn was above 15.5 percent. Research has demonstrated that the test weight of high moisture corn will increase during drying and corn discounted for test weight at high moisture might well measure above 54 pounds after drying. Adjusting test weight for differences in moisture is another example of Illinois elevators responding to changes in technology and marketing practices. As information was made available to show that moisture affected test weight, elevator managers adjusted their practices to accommodate this information.<sup>1</sup> All elevators reporting discounts for test weight in 1985 used a discount of 1 cent per bushel per pound below 54. The test weight discount was unchanged from 1981 and 1982 levels but was significantly below the test weight discounts of 1974 when weather conditions resulted in a large proportion of light test weight deliveries.

#### Solving the Problem of Rewetting

Over the past few years many articles have been written describing procedures by which farmers and elevators can raise the moisture content of corn dried below 15.5 percent, thereby increasing the weight of corn sold with no decrease in price. The Food and Drug Administration has stated that such rewetting is considered adulteration. In addition there are many potential problems created by attempts to add water back to corn or soybeans. Corn at 14 percent moisture is much less susceptible to mold and spoilage during long term storage but farmers and elevators are losing money if forced to

<sup>1</sup>Information on this research and a test weight adjustment table is available upon request.

sell their corn at less than 15.5 percent moisture. Because the FDA ruling applied to all methods of adding water (including blending and aeration) it was impossible to enforce but elevator managers were reluctant to continue encouraging an illegal and uneconomic practice. According to the survey of Illinois elevators many managers have turned this problem into a market opportunity. Fourteen percent of the elevators surveyed reported that they were paying premiums for corn dried below 15.5 percent moisture. Their reasons for paying a premium for lower moisture corn was (1) to obtain a larger volume of dry corn for blending purposes and thus avoid a drying cost on wet corn; (2) to increase the overall volume; and (3) to discourage farmers from adding water to grain that was already at a safe storage level. The general feeling of many managers was that a moisture base of 15.5 percent was too high because the corn did not store well but farmers and elevators were being penalized for drying below 15.5.

All the elevators reporting the use of premiums for dry grain said they had started within the last year and many others who were not offering the premium at the present time said they would do so if they could see a way to recover that cost when selling the grain. The opportunity which these managers have generated is one of a competitive edge over other elevators in obtaining low moisture, high quality grain to use as a source of blending income. The premium paid for corn below 15.5 percent varied from a low of 1 cent per bushel per point to a high of 3 cents per bushel per point. At a price premium of 4 cents per bushel per point the elevator would be paying approximately the full value of the extra dry matter being delivered. At that price premium a farmer would receive essentially the same price per pound of dry matter whether he delivered 14 percent moisture corn or if he added water and delivered 15.5 percent moisture corn.

Differences in moisture content or in the price of No. 2 corn will alter the relative value of the dry matter and therefore the breakeven price for corn below 15.5, just as with the price discounting system of the 1960's. This may suggest at some point in the future the same shrink factors now being used in the shrink plus drying charge technique will be applied to grain dried below the base moisture. The adjustment of quantity to equivalent bushels at 15.5 percent moisture will probably be accompanied by an appropriate charge against any corn that has been dried so severely that its quality (primarily susceptibility to breakage) has been damaged.

It will be interesting to follow the development of this new technique to see how rapidly it spreads among Illinois elevators through competition with one another and to see if a shrink factor approach will eventually replace a price adjustment technique introduced on a significant scale for the first time in 1984.

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## FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

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### Hidden Discounts in Grain and the Incentive for Rewetting

Farmers know that quality defects in their corn and soybeans will lower the price they receive for their grain, but few farmers recognize that they can also receive a discount for delivering top-quality grain. This "hidden discount" is often greater than the discounts for damage, foreign material, or excess moisture. Whenever a farmer delivers grain at a moisture level below the base set by the market, he has lost weight that could have been sold at the price of corn or soybeans. Although corn stored at moisture levels below 15 percent has a longer storage life, farmers who use this method to guarantee good keeping qualities will be penalized when the corn is delivered for sale.

In the case of discounts for high-moisture corn or soybeans, the reduced price is offset by the fact that the farmer is delivering additional water. In fact, many elevators subtract the weight of water from the scale weight to adjust the sale quantity to the weight it would have been had the grain been dried to the base moisture. In the case of grain that is below the base moisture, there is no compensating increase in value. Because price is seldom adjusted for grain below the base moisture, every 60 pounds of water removed from a load of soybeans means the seller will be paid for one less bushel. Water lost is worth its weight in grain up to the base moisture content. Every bushel of water removed from the grain represents a net loss to the seller equal to the price of corn, soybeans, or wheat. Farmers delivering grain above the base moisture receive less penalty than farmers delivering at lower moisture levels even though the drier grain will store longer, contains less mold and insect damage, and yield more final product per bushel.

Let's examine the principles of water loss in grain to better understand the concept of hidden discounts, the problems they create, and a solution to the problem.

#### Understanding Shrink

When grain contains excess moisture, buyers must subtract the excess weight of the water. They cannot afford to pay grain price for water. The weight adjustment for excess water is a fixed relationship that can be mathematically calculated independent of price or product. If 100 pounds of water is removed from a 500-bushel truckload of corn, the scale weight is 100 pounds less but the dry matter in the form of corn remains unchanged. The calculation can be easily demonstrated and the formula can be locked into a calculator. Conversion tables are also available.

Let's take an example of 100 pounds of corn at 25 percent moisture. This means there are 75 pounds of dry matter and 25 pounds of water in that 100 pounds of corn. Removing 1 pound of water leaves 75 pounds of dry matter and 24 pounds of water, but moisture content has not been lowered to 24 percent. The moisture content of the remaining 99 pounds of corn is now 24.2 percent (24 pounds of water divided by 99 pounds wet weight equals 24.2 percent). We would need to remove 1.32 pounds of water from this 100 pounds of corn in order to reduce it from 25 percent to 24 percent moisture content.

The formula for calculating any of the four variables involved in changes in weight associated with changes in moisture is:

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$(\% DM_w) \times (Q_w) = (\% DM_b) \times (Q_b)$   
 where:  $\% DM = \% \text{ dry matter} = 100 -$   
 $\% \text{ moisture content,}$   
 $Q = \text{quantity of grain in pounds, tons,}$   
 $\text{or bushels, and the subscripts w and b}$   
 $\text{identify wet-moisture and base-}$   
 $\text{moisture grain, respectively.}$

The formula for calculating remaining bushels is derived from this general formula. When drying 1,000 bushels of 25 percent moisture corn to 15 percent moisture, the remaining bushels are:

$$Q_b = \frac{\% DM_w}{\% DM_b} \times Q_w$$

$$Q_b = \frac{75}{85} \times 1,000 = 882.3$$

Shrink is calculated by subtracting the remaining bushels of base moisture ( $Q_b$ ) from original wet bushels ( $Q_w$ ) and dividing by original bushels.

$$(1,000 - 882.3) \div 1,000 = 0.1176 = 11.76\% \text{ for a reduction of 10 points, or } 1.176 \text{ percent per point of moisture removed}$$

The 1.176 percent is called the shrink factor and gives. This is the actual shrinkage in percent loss for each percentage point reduction. The shrink factor varies depending on ending moisture, but it can always be determined very simply by dividing the percent dry matter at base moisture ( $\% DM_b = 100 - \% M_b$ ) into 100. In the example above, the shrink factor is

$$\frac{100}{85} = 1.176\%$$

"Pencil shrink" is the term used when the loss of weight due to the reduction in moisture content is calculated rather than measured by actually weighing the grain before and after drying. Most elevators use a shrink factor that is multiplied by the percentage points of moisture removed times the number of bushels of grain. The 1.176 percent in the previous example is usually rounded to 1.2 percent. This

shrink factor approximates the actual weight loss for each percentage point of moisture reduction from any beginning moisture to a base moisture of 15.0 percent. The factor will vary slightly with the ending moisture. The shrink factor for 13 percent ending moisture is 1.49 percent. Many elevator managers use larger shrink factors as a way to cover losses incurred in handling and drying. In a recent survey, 7 percent of the respondents used a factor of 1.2 percent, 21 percent used a factor of 1.3 percent, and 71 percent used a factor of 1.4 percent or above. For a gross weight of 1,000 bushels of 18 percent moisture corn dried to 15 percent moisture, the difference between using the 1.4 percent shrink factor and the actual weight loss is equal to 6.7 bushels. The elevator has received 6.7 bushels more corn than was purchased from the farmer. While the elevator manager is entitled to this extra income in order to cover his operating costs, it would be helpful if costs were clearly differentiated from actual weight reduction. Different elevators using different shrink factors confuse producers who interpret the shrink factor as an actual weight loss that is unavoidable whether the corn is dried on the farm or at the elevator.

### Calculating Losses from the Hidden Discounts

The use of shrink factors for adjusting the weight of high-moisture grain to a base moisture are well recognized in the grain trade. However, the reverse adjustment for grain at moisture levels below the base is seldom used. If grain is dried below the base moisture, every bushel or ton contains more dry matter than the same weight of grain at the base moisture. For example, 100 bushels of soybeans at 10 percent moisture content is equivalent to 103 bushels at 13 percent base moisture. Farmers delivering corn, wheat, or soybeans below the base moisture are penalized by current pricing practices because they are paid for less grain than they actually deliver. If soybeans are priced at \$6.50 per bushel, the farmer in this example will receive a penalty of \$19.50, 19.5 cents per bushel. If using pencil shrink is justified on the grounds that elevators cannot afford to buy water at grain prices, then the reverse should also hold true. Farmers cannot afford to give away the extra three bushels of soybeans in the preceding example.

The losses that farmers incur by delivering grain below the base moisture are shown in Table 1. Corn is often dried to 14 percent to ensure that it will not be damaged by mold and insects during storage. Soybeans and wheat may dry to 9 or 10 percent moisture content in the field before the farmer can complete harvest. The table shows the equivalent bushels at the different moisture contents. Subtract 1,000 from each number and you can see the quantity that farmers give away at various moisture levels. Multiply the number by the price of grain and the economic penalty—the hidden discount—can be seen.

### Economic Incentives for Uneconomic Practices

The hidden discounts for grain dried below base moisture create economic incentives for implementing at least two management strategies that do not make sense from an economic standpoint.

1. Farmers and country elevators have an incentive to harvest, store, and sell grain (especially corn) at moisture levels above those recommended for safe storage and transport. The penalty for too much moisture is less than the penalty for too little.
2. Every seller who has grain below base moisture has an incentive to add water through spray misting, by aerating with humid air, or by blending with wet corn to increase the moisture content of the dry grain to base moisture.

None of these practices improve the quality or *intrinsic value* of the grain, but they do increase *market value* of the grain because the price per bushel is the same for 13 percent moisture corn as for 15 percent. In fact, adding moisture in these ways can create serious losses in storage and problems in quality control. They can also lead to potential abuses and illegal actions.

The Federal Grain Inspection Service (FGIS) of USDA, the Food and Drug Administration (FDA), and the U.S. Congress have all initiated actions to prohibit the addition of water to grain. Although FGIS's recent proposal to prohibit adding moisture was directed primarily at using moisture for dust control, the regulation is applicable throughout the market channel and includes farmers. The prohibition on adding water at port elevators will be relatively easy to enforce; enforcement throughout the market will be extremely difficult. Differentiating between grain that is naturally moist and grain moistened by deliberate actions is impossible. Moisture meters employed in grain transactions cannot differentiate between corn that has been dried from 17 percent down to 15 percent and corn that has been rewetted from 14 percent up to 15 percent.

Furthermore, there are many ways to increase the moisture content of grain. The direct application of water by mechanical means is a controversial method that has been illegal for many years under the Food, Drug and Cosmetic Act. However, aeration during periods

Table 1. Equivalent Bushels in 1,000 Bushels of Grain at Various Moisture Contents

Grain moisture, percent	Corn, 15.0% base	Soybeans, 13.0% base	Wheat, 13.5% base
8	1,082	1,057	1,064
9	1,071	1,046	1,052
10	1,059	1,034	1,040
11	1,047	1,023	1,029
12	1,035	1,011	1,017
13	1,024	1,000	1,006
14	1,012	989	994
15	1,000	977	983
16	988	966	971
17	976	954	960
18	965	943	948
19	953	931	936
20	941	920	925

when the humidity of the air is high can also add water to the grain. Blending grain of diverse moisture contents, even with only one or two percentage points difference, results in moisture moving from wet kernels to dry kernels. In this case, water is being added to the dry grain, although it can be attributed to a biological rather than a mechanical process. Farmers also recognize that the moisture content of corn, wheat, and soybeans can change in the field prior to harvest. The moisture content of soybeans may increase two or three percentage points between late afternoon and the following morning if there is a heavy dew. The kernel of corn or soybeans is indifferent to the source of moisture, whether it is from an adjacent kernel, from exposure to humid air, or from absorption during misting. The end results are the same.

The complexity of enforcing a prohibition on adding water to grain has plagued government agencies since French merchants were accused of wetting wheat to "freshen" and "swell its volume" in the early 1700s. In 1919, the secretary of agriculture expressly forbade the addition of water to oats following a national scandal in 1915 when elevator managers were found to be adding water prior to shipment. U.S. government agencies have recognized the difficulty of identifying grain that has been rewetted and have focused instead on trying to police the practice and technology of rewetting. FGIS has ruled that grain will be considered adulterated only if the moisture is added by mechanical means (that is, water or mist is sprayed directly on the grain). Other techniques for adding water to dry kernels will not be prohibited. Yet the other alternatives have the same end result. FDA regulations cover any method of increasing moisture content, but they rely on the farmer's motives to differentiate between adulteration and aeration, an even more difficult distinction to enforce. The FDA has ruled that aeration during high humidity is not illegal if the purpose of the aeration is to cool the grain. The addition of water to grain cannot be detected after the fact, and enforcement must rely upon inspectors actually observing the process or identifying the equipment installed for use in adding water.

## A Solution to the Rewetting Problem

There is a simple alternative to the complex prohibitions that are now being considered. The alternative has been proposed repeatedly since the early 1920s. A simple change in marketing practices to base price on the equivalent bushels would remove incentives for adding water to grain. If the economic incentives were removed, no water would be added unless it was needed for processing or quality control. Purchasing grain on the basis of the dry matter that it contains eliminates any economic advantage from adding water to dry grain. If a farmer has a load of 10 percent moisture soybeans that weighs 60,000 pounds on the elevator scales, the elevator manager can easily calculate that the 60,000 pounds is equivalent to 1,034 bushels at 13 percent moisture. The farmer's total payment should be the same whether he delivers the dry beans with a pencil adjustment or whether he takes the beans back home and runs them through a mist to bring the moisture content back to 13 percent. Buying on the basis of the dry matter in the soybeans (or any other grain) leaves the farmer equally well off if he delivers dry grain (which the market prefers) or if he adds water to increase the moisture content to the base level, increasing the weight across the scales but jeopardizing storability.

The proposal does not require major changes in pricing practices. Grains would be priced on the basis of current base moistures—15 percent for corn, 13 percent for soybeans, and 13 or 13.5 percent for wheat. The weight of all grain at any moisture content would be adjusted to the equivalent weight at the base moisture. The equivalent bushels can be calculated by formula or by using tables whether moisture content is above or below the base moisture. The same shrink factor that elevators use to adjust the weight of 18 percent moisture corn to the equivalent weight at 15 percent moisture can be used to adjust 10 percent soybeans to the equivalent weight at 13 percent moisture. If elevators were required to use the same formula for adjusting dry grain as they use for wet grain, shrink factors greater than actual water loss would quickly be reduced to the true

mathematical value. A standard is required to establish the amount of dry matter in an equivalent bushel of each grain. Table 2 shows the required weight using a suggested base moisture. Using the base moisture accepted for current market transactions eliminates the need to change quoted prices.

Overdrying of grain, primarily corn, lowers the quality of the grain because it becomes more susceptible to breakage during handling. Some people have argued that dry-matter pricing would encourage overdrying. This argument does not make sense. Why would producers deliberately incur the high costs of drying for no increase in price or value? Breakage susceptibility and broken corn are important quality characteristics, but elevator managers may discount on these factors if they want to further discourage farmers from drying below the optimum moisture content. Quality discounts should not be confused with adjustments in quantity for different moisture contents. Corn dried below safe moisture levels for safe storage is surely an accident or poor management on the part of the producer, not an intentional decision to overdry. Given the cost of drying and the potential for discounting brittle corn, the logical response of farmers to the equivalent bushel concept would be the delivery of all grain at the moisture content dictated by environment, storage, or handling methods.

The use of the equivalent bushel concept has the additional advantage of equity among producers—who should be paid according to grain value. Under the current pricing and discounting methods, elevators are earning a competitive return on their investment. Those returns are generated by charges for services, merchandising margins, and income derived from blending diverse moistures and qualities.

However, the farmer selling dry grain contributes the most to the elevator's blending income. Farmers selling grain at moisture levels below the base are paid less than the true value of their grain; farmers with wet grain are paid more than the true value. The current system is inequitable because the farmer doing the best job of quality control is subsidizing the farmer doing a poor job of managing moisture content. For example, a producer who has stored his grain at 16 percent moisture and delivers it to the elevator just as the first blue-eye mold begins to show will receive more total returns per thousand bushels than a farmer who has stored his corn at 14 percent moisture and delivers it in perfect condition with full storage life remaining.

The advantages of using the equivalent bushel concept are summarized below.

1. It removes the incentive for adding water to grain to increase its weight.
2. It separates the determination of quantity from the determination of quality.
3. It allows producers and marketing firms to select the optimum moisture content for managing storage, handling, and quality without being penalized on quantity.
4. It eliminates the inequity among sellers, requiring payment according to value.
5. It provides a more uniform basis for the export trade. Foreign buyers receiving 14 percent moisture corn on a 15 percent moisture contract will be required to pay for the extra dry matter.

The industry has the opportunity to take the initiative and adopt a strategy of pricing on the basis of equivalent bushels at base moisture.

*Table 2. Amount of Dry Matter Required for an Equivalent Bushel of Corn, Soybeans, and Wheat*

Grain	Base moisture, percent	Weight per bushel, pounds	Dry matter/bushel, pounds
Corn	15.0	56	47.6
Soybeans	13.0	60	52.2
Wheat	13.5	60	51.9

This would eliminate the need for legislation. The use of regulations is not a desirable alternative because it will be expensive and difficult to enforce, it will increase costs in the marketing channel, and it will not correct current inequities among sellers with grain above and below base moisture contents. The equivalent bushel (or ton) system eliminates the need for more government regulation.

Prepared by:

Lowell D. Hill  
Professor of Grain Marketing

Issued by:

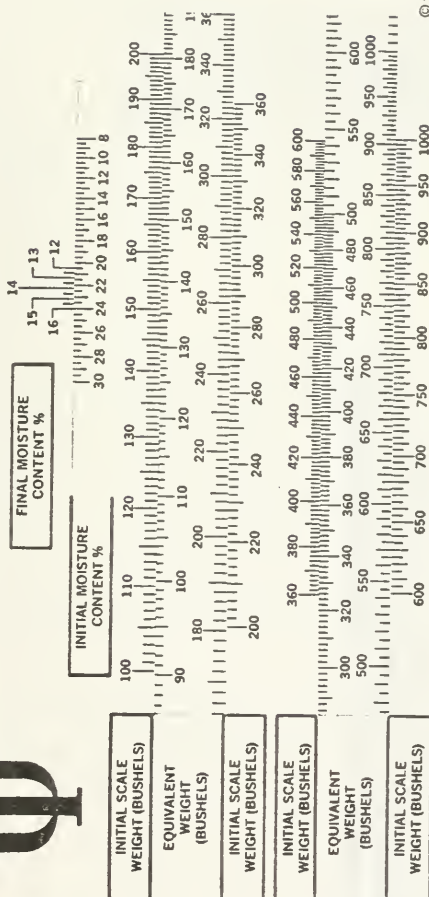
*Harold O. Guither*

Harold Guither





# EQUIVALENT BUSHEL CALCULATOR



**INSTRUCTIONS**

Match initial moisture content with final moisture content.

Read equivalent weight (bushels) at final moisture opposite initial weight.

The equivalent weight (bushels) determined [for final moisture levels between 12 and 16 percent] by this calculator accounts for the change of weight due to loss or gain of water in bringing any grain to a different final moisture content. The calculator is based on an average multiplier for final moistures between 12 and 16 percent. The true relationship for weight change due to moisture change is:  $(100 - \text{Initial Moisture Percent}) \div (100 - \text{Final Moisture Percent}) = \text{Multiplier to Apply to Initial Weight (bushels)}$ . For a reduction in moisture content the multiplier can be considered a "shrinkage factor"; conversely, for a gain in moisture content the multiplier can be considered an "expansion factor". Shrinkage and expansion shown by this calculator include only water loss or gain. Elevator shrink factors usually include an additional allowance for handling losses encountered when drying grain.

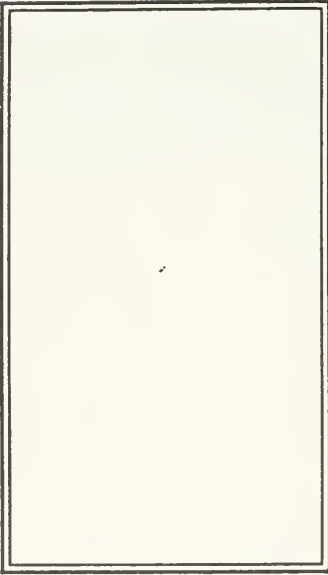
How to use Calculator:

To determine the equivalent bushels of 13 percent final moisture soybeans from 500 bushels of 10.5 percent soybeans, align 10.5 initial moisture with the 13.0 final moisture index. Read 514 equivalent weight (bushels) opposite 500 initial scale weight (bushels).

By calculation  $[(100 - 10.5\%) \div (100 - 13.0\%)] \times 500 = 514.37$  equivalent bushels.

Developed by Dr. Gene C. Shove and Dr. Lowell D. Hill

Department of Agricultural Engineering and Agricultural Economics  
University of Illinois, Urbana, Illinois 61801



## TESTIMONY BY

*Dr. Calvin B. Parnell, Jr. P.E.*

Professor

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## TO

*U.S. HOUSE OF REPRESENTATIVES*

Committee on Agriculture

Subcommittee on General Farm Commodities

Room 1301, Longworth House Office Building

October 7, 1993

## TESTIMONY

For the record, I am Calvin B. Parnell, Jr., 1103 Pershing, College Station, Texas. I am a Professor in the Agricultural Engineering Department at Texas A&M University. Although I am a professor at Texas A&M University, my testimony represents my views and should not be construed as a position of Texas A&M University or the Texas A&M University System.

### BACKGROUND

In my role as a teacher and researcher in the Agricultural Engineering Department at Texas A&M University I have been involved in research and teaching activities that relate to this controversial issue. My research has included the following:

- Minimum Explosive Concentrations of Grain Dust
- Recombination & Recirculation Dust Systems at Export Elevators
- Air Pollution Abatement Systems for Agricultural Facilities
- Grain Dust Suppression Using Mineral Oil

I teach the processing course that includes grain drying, applied thermodynamics and psychometrics. I have the unique experience of serving as a member of the Texas Air Control Board (TACB), the air pollution regulatory agency for Texas for 3½ years. I have served as a consulting engineer in evaluating the causes of a number of grain dust explosions.

### MY POSITION

I oppose a rule or legislative mandate that would disallow the addition of water to grain for dust suppression. I believe that a rule to limit the application rate of water to grain for dust suppression or air pollution control to include the enforcement criteria should be developed by the appropriate regulatory agencies. I believe a legislative ban would be inappropriate and would limit the ability of regulatory agencies to allow a practice that would provide for safer work environments and possibly less air pollution. In my view, a "ban" on the addition of water to grain would impact FGIS, OSHA, EPA and FDA and rule-making should involve representatives of each of these regulatory agencies. I believe the safety benefits from prevention of dust explosions by using water to suppress dust at grain transfer points in country elevators is sufficient justification to oppose a "ban". I believe that a total application rate of 20 to 30 gallons per 1000 bushels<sup>1</sup> with multiple application points to moving grain with no more than 5 gallons per 1000 bushels per

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<sup>1</sup> At 56 pounds per bushel for corn, addition of 0.3% water by weight is equivalent to 20.2 gallons water per 1000 bushels. At 60 pounds per bushel (soybeans, wheat), addition of 0.3% water by weight is equivalent to 21.6 gallons per 1000 bushels. Addition of water at 0.5% by weight for corn is equivalent to 33.6 gallons per 1000 bushels; soybeans and wheat, 36 gallons per 1000 bushels.

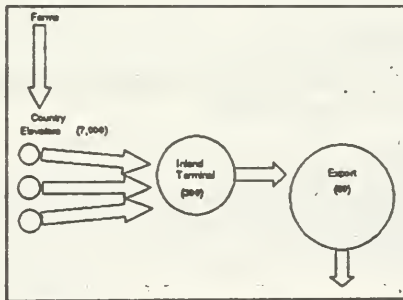
application point would not allow a grain elevator to manipulate the marketing system. 20 gallons per 1000 bushels is approximately 4.5 ounces of water per 100 pounds of grain; 30 gallons per 1000 bushels is less than 8 ounces per 100 pounds of grain. (A cup of water is 8 ounces.)

## GRAIN INDUSTRY

Production, marketing, processing, storage and exporting of U.S. grain involves three types of grain elevators:

1) Country Elevators	7,000
2) Inland Terminals	300
3) Export Elevators	60

Of the 7000 Country elevators, many handle 10 to 20 million bushels per year. Typically, they have bucket elevator legs, belt conveyors and drag conveyors that handle 10 to 15 thousand bushels per hour. Many of these facilities were built before the series of disastrous explosions occurred in the late 70's and early 80's. If an elevator is built today, it is designed differently. Elevation of grain is accomplished with a series of inclined belt conveyors or legs outside the headhouse with ample explosion venting. What do you do when you have an older elevator with legs inside the facility? The answer is: you do everything you can to make your elevator as safe as possible but you must make a profit to stay in business.

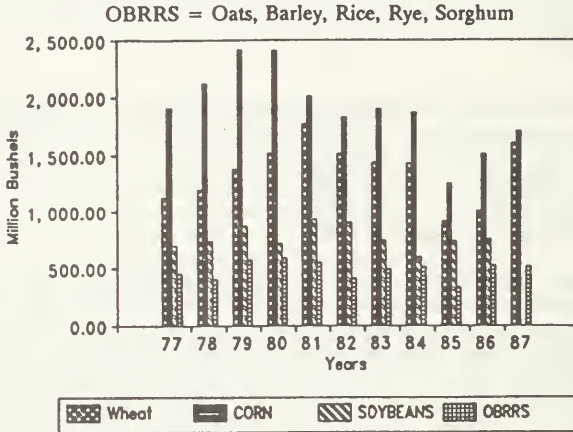


Approximately 4.5 billion (B) bushels of grain are exported by the U.S. each year. Of this total, approximately 50% is corn, 25% is wheat and 15% is soybeans. Corn, wheat



and soybeans make up 90% (4.0 B bushels) of the total U.S. grain exports each year. As seen in the figure below, the remaining combined exports of oats, barley, rice, rye and sorghum designated OBRRS make up approximately 10% of our total exports.

### GRAIN EXPORTS COMPARISON FOR 1977-1987



U.S. GRAIN EXPORTS, 1977-1987 (USDA, 1988)

### GRAIN DUST EXPLOSIONS

A grain dust explosion requires four ingredients. If any one of the four is not present, an explosion will not occur. These ingredients are:

1. Oxygen,
2. Ignition Source,
3. Grain dust in suspension at or above the minimum explosive concentration (MEC) and
4. Containment.

Grain dust explosions will not occur if the concentrations of grain dust in suspension is less than the MEC.

In my research, the MEC of grain dust is 100 grams per cubic meter ( $\text{g/m}^3$ ), however a conservative concentration of  $50 \text{ g/m}^3$  is generally used when defining an MEC for grain dust. If you were standing in a room in the presence of a MEC concentration, you would not be able to see your fingers on your outstretched arm.

The engineering approach for prevention of grain dust explosions is to prevent MEC's at grain transfer points.

In order to prevent MEC's at grain transfer points, three options are available.

1. **Pneumatic dust control (PDC)** - A simple description of this method is the "vacuum cleaner" (VC). It consists of removing air from the grain transfer point to lower the concentration. This dust and air is transported to a filter. The filtration process consists of accumulating dust on the outside of filter bags where the dust layer serves to increase the dust capture efficiency. Periodically, reverse compressed air cleans the bags. When the bags are cleaned, dust falls from the bags to a hopper. As the dust falls, an MEC occurs. A common misconception is that PDC systems remove all dust from grain. They remove approximately 5% of the dust in grain at a transfer point. They do lower the dust concentration. They are expensive and maintenance intensive. Each dust control system will cost \$100,000 to \$300,000. Each filter will periodically have an MEC.
2. **Mineral oil** - Food grade mineral oil is sprayed on grain. The fine dust particles "stick" to the grain surface, hence they are not entrained in the air at grain transfer points. The concentrations of dust in air at transfer points is reduced to less than the MEC. Application rates are limited by FDA to less than 200 ppm ( $1\frac{1}{2}$  gallons per 1000 bu.). Most apply 1 gallon/1000 bu. Food grade mineral oil will cost approximately \$2 per gallon. A 20 million bushel country elevator will spend \$40,000 per year on oil when 1 gallon per 1000 bu. is applied on all grain.
3. **Water** - Water is sprayed on grain and grain dust at the transfer points. Grain dust is suppressed. The mechanism of this process is likely similar to the mineral oil process in that fine dust particles are temporarily attached to the grain surface. Because the application rate needs to be 5 to 20 times greater than oil to be effective, it is likely that water droplets combine with dust entrained in air causing these particles to fall out. The cost of water is \$0.005 per gallon.

Examples of grain transfer points where an MEC can occur include:

1. Unloading pit to belt or drag conveyor in the basement,
2. Boot of the leg(s),
3. Head of the leg(s),
4. Tripper to the bin, and
5. Spout below bin to the belt.

Many of these country elevators have inside concrete legs. It is not possible to engineer retrofit explosion venting systems for concrete legs. Of the known locations for the primary (first) explosion in the typical series of explosions in an elevator, the leg is the most prominent.

#### AIR POLLUTION PROBLEMS WITH COUNTRY ELEVATORS

1. Unloading pit- When grain from the truck falls into the unloading pit, dust "boils" out of the pit area.
2. Load out area- When grain falls into the rail-car, dust is emitted in a similar manner.

Water dust suppression can be used for the following applications:

1. Suppress dust in the boot and head of legs to prevent dust explosions.
2. Suppress dust in covered conveyors in the basement area to prevent dust explosions.
3. Suppress dust at the tripper where grain enters bins to prevent dust explosions.
4. Suppress dust from the unloading pit to comply with air pollution regulations.
5. Suppress dust from the load-out area to comply with air pollution regulations.

## FIELD TRIP

I traveled to Nebraska (Sept 27 and 28, 1993) and observed the use of water for dust suppression in country elevators. These elevators were applying drinking quality water at multiple sites and using less than a total of 20 gallons per 1000 bu. for dust suppression. They were experimenting with water fogging systems in an attempt to reduce their application rate even further. It may be possible to achieve the goal of dust suppression with a total application rate of less than 20 gallons/1000 bu with multiple application points.

The cost of dust suppression with water at a total application rate of 20 gallons per 1000 bu would be approximately \$0.10 per 1000 bushels. These same elevators use mineral oil during freezing weather conditions. If a country elevator were to use water during periods of warm weather, they could save \$1.90 per 1000 bu. (Assuming the cost of oil is \$2.00/gallon). If water dust suppression was banned, this savings would be eliminated. For a 20 million bushel country elevator, using water for 10M bushels and oil for 10M bushels, the total cost of dust suppression would be \$21,000 per year versus \$40,000 per year if it were to used mineral oil at a rate of 1 gallon per 1000 bu for the entire 20M bushels.

It is difficult for the 7000 country elevators to depend upon the "vacuum cleaner"(VC) approach to reduce the concentrations of dust at grain transfer points. Each of these systems will require a capital investment of \$5 to \$10 per cubic foot per minute (cfm) of air flow. A 10,000 cfm VC at the unloading pit will require \$100,000. Most elevator operators are concerned about inside legs especially inside concrete legs. The cost of providing a safer elevator with the VC approach is several orders of magnitude greater than that associated with oil or water.

## EQUILIBRIUM MOISTURE CONTENT (EQM)

This issue is controversial because some individuals believe that there is the potential of manipulating the grain marketing system. To demonstrate how difficult it is to detect a 0.5% change in moisture content (wb), a comparison of equilibrium moisture contents of corn and soybeans at conditions that may be present at a upper midwest elevator and an export elevator in New Orleans may be helpful. Reference ASAE Standard D243.4 (Dec92). In an environment of 50 °F and 30% relative humidity (upper midwest), corn will have an EQM of 9.3% (wb); soybeans in an environment of 41 °F and 30% RH will have an EQM of 9.8%. In an environment of 90 °F and 90% relative humidity (New Orleans), corn will have an EQM of 19.3%; soybeans at 95 °F and 90% RH will have an EQM of 20.6%. There can be a 10% change in moisture in grain through absorption of water from the environment by moving the grain from the upper midwest to New Orleans.

SUMMARY

I believe it would be a mistake to ban water for dust suppression in grain elevators. The safety benefits achieved by reducing MEC's in elevators by using small amounts (1/2 cup per 100 pounds) far outweigh the perception that grain quality is affected. I believe rules should be developed to limit the application rate to 20 to 30 gallons per 1000 bu. I believe that OSHA, EPA, FDA and FGIS should be involved in the rule-making. I believe that those who choose to abuse water application will do so whether a rule exists or not and that there exist sufficient checks and balances in our current system to locate and punish the abusers. I do not subscribe to the philosophy expressed by some that the rampant abuse will require an FGIS regulator in every elevator.

(The photographs are held in the committee files.)





**TEXAS A&M UNIVERSITY**  
Department of Agricultural Engineering

October 13, 1993

Honorable Tim Johnson, Chairman  
Subcommittee on General Farm Commodities, Committee on Agriculture  
U.S. House of Representatives  
Room 1301, Longworth House Office Building  
Washington, D.C. 20515

Dear Congressman Johnson:

On October 7, 1993, following my testimony to your committee, I was asked several questions. Because of time constraints, I don't think that my answers were understood. I respectfully request that this letter be added to my testimony.

It is my position that you cannot have a dust explosion unless you have four ingredients. One of those ingredients is a minimum explosive concentration which I refer to as a MEC. The most common occurrences of MEC's in grain elevators are at grain transfer points. I identified typical grain transfer points in my testimony in the record. As grain tumbles at a transfer point, a portion of the dust that is in grain is entrained in the air. Typically, grain will contain 0.1% to 1% grain dust. This dust is not "dirt". It has the same properties as its parent grain. A sample of corn dust was left with the committee.

It is possible and likely that minimum explosive concentrations or MEC's will occur at these grain transfer points. In order to make grain elevators safer, it is the responsibility of the manager of the facility to minimize the occurrence of these MEC's. By minimizing the occurrence of MEC's, the elevator is safer and less likely to explode. My position is that there are only three methods for minimizing the occurrence of MEC's at grain transfer points. These are (1) pneumatic dust control, (2) application of oil and (3) application of water. Each of these three methods can be used to reduce the dust concentration at the transfer point to less than the MEC. If the Congress and/or FGIS were to ban the application of water for dust suppression, they will be removing an alternative for making the elevator safer.



I believe that dust suppression with water works. I have placed in the record photographs demonstrating water dust suppression in an actual grain elevator. It suppressed dust. The position on the part of FGIS and others is that there are better methods for suppressing dust. Based on my premise that there are only three methods to reduce the concentrations of dust at a grain transfer point, their position is that pneumatic dust control and/or the application of oil are better methods than the application of water. In my view, if a country elevator has the opportunity to utilize water for dust suppression at a cost significantly less than the application of oil and/or significantly less than pneumatic dust control, the application of water is better. In my testimony I said there needed to be a limit on the application of water to grain for dust suppression. I proposed that the limit be 0.5% by weight which amounts to less than one cup (8 ounces) of water per 100 pounds of grain. My proposal recommended that this limit be the upper limit and that the elevator manager be allowed to utilize this technology at multiple application points provided the total amount of water used did not exceed 0.5% by weight or 1 cup of drinking water quality water per 100 pounds of grain.

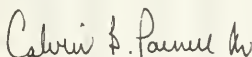
You heard testimony on October 7 from people who stated that any application of water to grain will hurt the quality of grain. I disagree. If you were to take 100 pounds of corn, for example, at a 11% moisture content (wb), it will contain 11 pounds of water ( $H_2O$ ). If you uniformly apply 0.5% by weight of water to that 100 pounds, you will be adding a half a pound of water and you will be increasing the moisture content of that grain by 0.44%. (This is assuming that none of the water evaporates.) If you were to take that same 100 pounds in a condition of 77°F and 50% relative humidity, its equilibrium moisture content would be 11% wet basis. (See enclosed ASAE Standard.) If that same grain were to be exposed to a condition of 77°F and 60% relative humidity, its equilibrium moisture content would be 12.2% wet basis. This 1.2% change in moisture content by grain adsorbing water ( $H_2O$ ) from the air is the equivalent of adding 1.4 pounds (21.2 ounces) of water per 100 pounds. This means that a mere increase of 10% relative humidity in the storage condition of grain with the temperature constant can result in 3 times as much moisture in grain than if country elevators were allowed to utilize a total application rate of 0.5% by weight. I contend that this same grain at 11% moisture content (wb) would not have a decrease in quality if its moisture content were increased by 0.44% by total application of 0.5% water by weight for the purpose of prevention of grain dust explosions and/or complying with air pollution regulations.

One of the questions asked was why can't the 7000 country elevators utilize the safety and environmental methods and procedures used by one of the

major grain companies in the U.S. This company's representative indicated that they did not use water for dust suppression and had a history of no explosions. It is a simple question to answer. Many of the 7000 country elevators do not have the resources that this major company has. These resources are not just monetary but include engineering expertise. It should be pointed out that few in the grain industry are using water for dust suppression but representatives of many of these firms (not using water for dust suppression) are convinced that either it doesn't work or there are better methods. The one company that is using this technology (Peavey) is convinced that it does work at very small application rates. I am convinced that it does work.

It is essential in today's time that we place emphasis on allowing small businesses economical means of complying with air pollution regulations and/or OSHA regulations to make their facilities safer and to comply with environmental rules. The technology of using water for dust suppression can be used effectively as an economical means for complying with regulations. In my view, the application of water for dust suppression for safety and for environmental quality reasons is well justified. I thank you for allowing me to provide this additional input into my testimony.

Sincerely,



Calvin B. Parnell, Jr., P.E.

cc: Dr. Don Bender, Texas A&M University  
Dr. Ed. A. Hiler, Texas A&M University  
Congressman Sarpalius, Washington, D.C.  
Congressman De La Garza, Washington, D.C.

Enclosure Table I ASAE Standard D245.4 Moisture Relationships of Grain, American Society of Agricultural Engineers, St. Joseph, MO.

TABLE 1—EQUILIBRIUM MOISTURE CONTENT OF GRAINS AND SEEDS (PERCENT WET BASIS)

	Temp		Relative Humidity (Percent)									
	°C	°F	10	20	30	40	50	60	70	80	90	100
Barley	25	77	4.7	5.9	8.4	9.8	10.6	11.9	13.4	15.7	19.2	26.5
Buckwheat	25	77	5.6	7.7	9.2	10.2	11.2	12.4	13.9	15.9	19.1	24.1
Cottonseed	25	77				6.9	7.8	9.1	10.1	12.9	19.6	
Dry beans, Michelle	4	40						12.8	14.4	17.0		
	10	50						13.6	15.3	18.1		
	38	100						12.0	14.2	17.1		
	54	130						12.5	14.3	16.6		
	25	77	5.5	7.4	8.5	9.6	11.0	12.6	14.9	18.2*		
Dry beans, red Mexican	25	77	5.8	7.5	8.7	9.7	10.1	12.7	15.2	18.5*		
Dry beans, great Northern	25	77	5.9	7.8	8.4	9.5	10.9	12.6	14.8	17.5*		
Dry beans, light red kidney	25	77	5.9	7.7	9.0	9.8	11.0	12.6	15.0	18.9*		
Dry beans, dark red kidney	25	77	5.2	7.1	8.2	9.5	11.0	12.7	15.0	17.9*		
Dry beans, flat, small white	25	77	5.8	7.4	8.8	9.5	10.8	12.5	14.9	18.3*		
Dry beans, pinto	25	77	5.7	7.5	8.8	9.7	11.1	12.3	15.1	18.4*		
Flaxseed	25	77	3.8	5.0	5.5	6.1	6.7	7.7	9.2	11.2	14.9	21.1
	25	77				6.1	6.8	7.9	9.3	11.4	15.7	
Bromegrass, rescue	- 1	30			6.7	8.3	9.8	11.0	12.2	13.6		
	49	120			5.8	7.5	8.5	11.1	12.9	15.9		
Legume, crimson clover	- 1	30	5.9	7.4	8.5	9.8	10.1	10.8	11.3	12.0		
	18	60	5.1	6.7	7.8	8.1	9.5	10.2	11.0	11.9		
	32	90	4.3	5.8	7.0	7.9	8.8	9.4	10.2	11.4		
	49	120	3.1	4.9	6.1	7.1	7.7	8.5	9.5	10.6		
Legume, blue lupine	- 1	30	6.0	7.7	9.3	10.8	12.1	13.2	14.6	15.6		
	16	60		6.0	7.9	9.4	10.8	12.0	13.2	14.9		
	22	90			6.2	7.7	8.8	10.5	11.9	13.5		
	49	120				6.0	7.4	8.8	10.2	11.7		
Oats	25	77	4.5	5.8	8.2	9.4	10.8	11.4	12.8	15.0	18.2	23.9
Peanuts, whole pods	10	50			5.4	6.8	7.7	8.9	10.8	13.0	14.6	
	21	70			4.0	5.1	6.2	7.2	8.4	9.6	11.2	12.8
	32	90			3.6	4.6	5.8	6.6	7.7	8.9	10.5	12.7
Peanuts, kernels	10	50			4.0	4.9	5.7	6.4	7.2	8.1	9.1	10.5
	21	70			3.4	4.3	5.1	5.9	6.7	7.7	8.9	10.8
	32	90			3.0	3.9	4.7	5.5	6.5	7.5	8.5	10.6
Peanuts, hulls	10	50			7.3	9.1	10.7	12.3	13.9	15.8	18.0	21.2
	21	70			6.2	7.9	9.4	11.0	12.6	14.5	16.8	20.1
	32	90			5.5	7.1	8.5	10.2	11.8	13.6	15.9	19.8
	25	77	5.9	8.0	9.5	10.9	12.2	13.5	14.1	15.2	19.1	
Rice, whole grain	38	100	4.9	7.0	8.4	9.8	11.1	12.3	13.8	14.8	19.1	
Rice, milled	25	77	4.9	7.7	9.5	10.8	11.0	12.0	13.4	15.2	18.3	23.8
Rice, rough	27	80				10.2	11.7	12.7	13.2	14.9	17.2	
	32	90					11.2	12.9	14.8	16.8		
	44	111					10.3	12.8	14.8	16.5		
	0	32		8.2	9.9	11.1	12.3	13.3	14.5	16.6	19.2	
	20	68		7.6	9.1	10.4	11.4	12.5	13.7	15.2	17.6	
	30	86		7.1	8.5	10.0	10.9	11.9	13.1	14.7	17.1	
	25	77	4.5	6.5	7.9	9.4	10.6	12.2	13.4	14.8	16.7	
	23	73	4.9	7.3	8.7	9.8	10.9	12.4	13.5	15.8	19.0	
Rye	25	77	5.8	7.4	8.8	9.8	10.8	12.2	13.9	16.8	19.6	25.7
Shelled corn, YD	10	50	6.6	8.0	9.8	10.8	12.2	13.8	15.2	17.5	21.6	
	32	90	4.9	6.6	7.7	9.8	10.8	12.4	14.0	16.2	19.3	
	49	120				8.8	10.0	11.2	13.1	14.9		
	68	155				7.4	8.4	10.0	11.5	12.2		
	- 1	30	3.8	7.0	9.1	11.2	13.0	14.5	17.6			
	18	60		4.9	7.2	9.0	10.7	12.3	14.1			
	32	90			5.3	7.1	8.7	10.1	11.8	13.3		
	49	120				5.2	6.7	7.9	9.3	10.7		
	0	32				11.0	12.4	14.0	15.7	18.0	21.8	
	30	86				10.8	12.3	13.8	15.8	17.8	20.0	
	4	40	8.4	8.8	9.9	11.2	12.8	13.9	15.6	17.7	21.4	
	19	60	5.6	7.8	9.3	10.5	11.6	13.6	14.2	16.3	19.8	
	27	80	4.2	6.4	7.9	9.2	10.8	11.5	12.9	14.8	17.5	
	38	100	4.2	6.2	7.6	8.5	9.8	11.3	12.5	14.4	16.9	
	50	122	3.6	5.7	7.0	8.1	9.5	10.5	11.9	13.9	16.3	
	80	140	2.0	5.0	6.0	7.0	7.9	8.5	10.3	12.1	14.8	
	- 7	20				11.8	13.3	15.0	16.6			
	0	32				10.0	11.8	12.8	14.1	16.7		
	10	50				9.2	10.7	12.1	13.7	15.4		
	21	70				8.4	9.8	11.5	13.2			
Shelled corn, WD	25	77	5.0	7.1	8.8	10.0	11.0	12.4	14.0	16.1	19.0	23.6
Shelled popcorn	25	77	5.2	7.4	8.9	10.1	11.0	12.2	13.7	15.9	19.1	24.5
Sorghum	25	77	5.8	7.5	8.4	9.2	10.2	11.4	13.1	15.1	18.2	22.7
	- 1	30	6.1	8.3	10.0	11.3	12.4	13.4	14.6	15.8		
	18	60	5.4	7.7	9.5	10.7	11.9	13.0	14.1	15.2		
	32	90	4.7	7.1	8.8	10.1	11.3	12.4	13.5	14.7		
	49	120			8.6	9.5	10.7	11.7	12.9	14.1		
Sorghum, kafir	4	40	8.8	8.5	9.7	11.0	12.3	13.7	15.3	17.3		
	21	70	6.0	7.7	9.1	10.4	11.5	12.8	14.2	16.0		
	32	90	5.0	7.0	8.4	9.5	10.8	12.0	13.2	14.7		

\* Unreliable because of mold growth.

TABLE 1—EQUILIBRIUM MOISTURE CONTENT OF GRAINS AND SEEDS (PERCENT WET BASIS) (cont'd)

	Temp		Relative Humidity (Percent)									
	°C	°F	16	20	30	40	50	60	75	90	95	100
Soybeans	5	41	5.2	5.3	5.9	7.7	8.6	10.4	13.9	18.9	22.4	
	15	59	4.8	5.7	6.5	7.2	8.1	10.1	12.4	16.1	21.9	
	25	77	3.8	5.3	6.1	6.6	7.8	9.7	12.1	15.8	21.3	
	35	95	3.5	4.8	5.7	6.4	7.6	9.5	11.7	15.4	20.6	
	45	113	2.9	4.0	5.0	6.0	7.1	8.7	11.1	14.9		
	55	131	2.7	3.6	4.2	5.4	6.5	8.0	10.6			
	25	77				7.0	8.0	10.1	12.2	16.0	20.7	
	25	77		5.5	6.5	7.1	8.0	9.3	11.5	14.8	18.8	
Sugar beet seeds	4	40			10.0	11.5	12.7	13.8	15.3	17.6	22.6	
	16	60			9.0	10.0	11.5	12.5	14.1	16.2	18.9	
	27	80			8.0	9.1	10.4	11.6	12.9	14.7	18.0	
	38	100			7.0	8.3	9.3	10.4	11.5	13.2	15.8	
Wheat, soft red winter	- 7	20					12.8	14.1	15.6	17.0		
	0	32				11.0	12.3	13.5	14.7	16.2		
	10	50				10.2	11.7	13.1	14.4	16.0		
	31	70				9.7	11.0	12.4	14.0			
	25	77	4.8	7.0	8.0	9.3	10.3	12.1	13.6	15.8	19.3	25.7
Wheat, hard red winter	25	77	5.0	7.2	8.2	9.6	10.9	12.1	13.8	16.0	19.4	25.4
Wheat, hard red spring	25	77	5.3	7.2	8.4	9.5	10.7	12.3	14.0	16.3	19.6	25.2
Wheat, white	25	77	5.4	7.1	8.2	9.3	10.4	11.9	13.7	16.2	19.6	25.9
Wheat, durum	25	77	5.3	7.3	8.5	9.4	10.4	11.7	13.4	16.8	19.5	26.7
Wheat	25	77	5.7	7.6	9.0	10.5	11.9	13.1	14.7	16.7	17.1	
	50	122	3.9	5.6	6.9	8.3	9.6	10.9	12.7	15.1	19.0	
	- 1	30		7.1	9.1	10.6	12.1	13.5	14.7	16.5		
	16	60		6.0	8.2	9.7	11.3	12.8	13.9	15.6		
	33	90		5.1	7.1	8.8	10.4	11.7	13.0	14.7		
	49	120			6.2	7.9	9.5	10.8	12.1	13.8		
	20	68	5.5	7.0	8.2	9.6	10.9	12.0	13.4	14.8	17.1	
	40	104	5.3	8.0	7.4	8.6	9.7	11.0	12.3	14.0	16.3	
	80	176	2.4	3.6	4.6	5.5	6.7	7.8	9.8	11.4	13.9	
	0	32		8.6	10.0	11.5	13.0	14.6	16.3	18.0	21.5	
	20	68			9.1	10.5	12.0	13.5	15.2	16.7	21.0	
	40	104			8.3	9.4	10.9	12.3	14.0	16.0	20.0	
	10	50		8.7	9.9	10.9	12.0	13.3	14.8	16.9		



STATEMENT OF

DR. ROBERT W. SCHOEFF  
PROFESSOR EMERITUS

DEPARTMENT OF GRAIN SCIENCE AND INDUSTRY  
KANSAS STATE UNIVERSITY

SHELLENBERGER HALL  
MANHATTAN, KANSAS 66506-2201

BEFORE THE SUBCOMMITTEE ON  
GENERAL FARM COMMODITIES

U.S. HOUSE OF REPRESENTATIVES

OCTOBER 7, 1993

Mr. Chairman, thank you for this opportunity to address the Subcommittee on a safety matter of great importance to the grain industry.

I produced the film "Deadly Dust II" which I understand has been viewed by many of the Subcommittee members and staff. More than 900 copies of the film have been distributed to 328 firms located in 37 states and 37 foreign countries. I have forty years of experience in the grain industry. The focus of my career has been to educate management on the commitment they must make to protect their most important asset -- their employees. The physical facilities, raw materials, and finished products are important too, but should not have priority over people.

It is the responsibility of management to provide a safe and healthful place to work. We now have laws and regulations in most industrialized countries to ensure management of firms does meet certain minimum standards of safety for the protection of workers. In the U.S., OSHA -- the Occupational Safety and Health Act of 1970 provides this standard.

A series of major grain dust explosions in the U.S. in December of 1977 and many fatalities captured the attention of the news media, government officials, trade associations, labor unions and grain industry management.

The public and most grain industry personnel were shocked that grain dust could be so explosive and cause so many fatalities, injuries and physical devastation.

Grain dust explosions are not a new phenomena as some believe. Records show a flour dust explosion occurred at Turin, Italy in 1785 and in the U.S. more than 100 years ago. In 1878 a disaster in Minneapolis wiped out six flour mills, one feed mill, one planing mill and killed 18 people. In 1918 the United States Department of Agriculture published a bulletin on "Preventing Grain Dust Explosions". These same researchers wrote a book in 1922 on "The Phenomena of Dust Explosions" that was published by the National Fire Protection Association.

Grain, especially wheat, is a basic food crop and mankind cannot exist without it. Therefore, we must find ways to safely produce, store, transport and process grain for human and animal food.

Employees are the most important asset of any business. Their safety and health must be a primary concern of management.

Attached is a report on the number of grain dust explosions for the ten year period 1983-1992. There have been 27 fatalities and 132 injuries during this period. The leading state for elevator explosions is Illinois, followed by Iowa and Nebraska. Tied for fourth are Kansas and Minnesota and Texas is fifth. Representatives from all these states serve on this Subcommittee. I know you share my concern for the safety of grain elevator workers in your states.

#### Background on Grain Dust

Grain dust is not dirt! There is great misunderstanding as to what grain dust is. Grain dust is the fine particles created in the harvesting, handling, transporting, and processing through breakage and scouring action.

In physical measurements, dust is composed of those particles that pass through a 105 micron screen, or in the U.S., a #150 sieve.

Material collected in a typical dust collection system using cyclones and/or bag filters will contain particles of varying size from the grain, other parts of the plant, weed seed, etc. This material has excellent feed value for all large animals.

#### Grain Dust is explosive!

Under the right conditions, grain dust can be very explosive. Treat it with respect and handle it carefully! All organic dusts and some metals will explode under the right conditions. Corn and wheat starch are the most explosive materials.

For a grain dust explosion to occur, the following conditions must be met. They must all be present at the same time and removing any one of them will remove the potential for an explosion:

- 1) Air
- 2) Fuel
- 3) Ignition
- 4) Dust in Suspension
- 5) Minimum Dust Concentration
- 6) Dry Dust

The smaller the dust particle (under 100 micron), the drier the dust (under 15.5% moisture), the easier it is to ignite (380 degrees Celsius, 716 degrees Fahrenheit), the faster the combustion process (8,9000 ft/sec, 2,743 m/sec), the higher and more rapid the temperature rise (over 1093 degrees Celsius, 2000 degrees Fahrenheit) are all factors. Obstructions cause greater turbulence, more rapid pressure increases and higher static pressures (100-200 pounds) per square inch (PSI).

Glass will break at 1/2 to 1 PSI; wood structures at 1 to 2 PSI; concrete structures at 2 to 8 PSI. It takes about 1 PSI to knock a person down, 5 PSI to rupture an eardrum.

#### Primary and Secondary Explosions

The primary explosion usually occurs in conveying equipment, processing equipment, storage bins or dust collectors. The vertical elevator leg is the most frequent place because of the high concentrations of suspended grain dust created when the leg is operating.

The primary explosion will, in most cases, rupture the leg housing or the container in which it occurs. The concussion and release of pressure can shake an entire building and this, along with the released pressure wave, will cause resting dust on beams, overhead pipes, walls and the floor to become suspended. The flame front from the primary explosion becomes a bigger and bigger ignition source for the secondary explosion or explosions depending on existing conditions.

Typically it is the secondary explosion(s) that cause the most damage. As many as 12 explosions have occurred in less than two minutes.

An explosion occurs in only milliseconds. Recent research indicates that the turbulence created by the pressure wave striking posts, equipment, walls and end of tunnels causes the process to occur much more rapidly than found in the laboratory. This increases the temperature and pressure thereby causing the greater damage to personnel and buildings.

Mr. Chairman, grain dust explosions are still a serious problem for the grain handling community. Preventing them has been the primary focus of my work. I would like grain elevators to have access to all the tools and technology -- including liquid additives such as oil and water -- which control grain dust and prevent explosions. I would be happy to respond to any questions that you might have on the causes of these explosions or the safety records in your states.

(Attachments follow:)



### Cooperative Extension Service

Extension Grain Science and Industry  
Shellenberger Hall  
Manhattan, Kansas 66506-2201  
913-532-6161  
FAX: 913-532-7010

January 8, 1993

## Grain Dust Explosions - Record Low

in 1992\*

A record low, six grain dust explosions were reported in the U.S. for 1992 according to data compiled by Ralph Regan, FGIS Safety Director, and Robert W. Schoeff, Consultant and Professor Emeritus, Kansas State University. This compares to 12 in 1991 and a ten-year average of 15 explosions.

There was one fatality and eight injured.

Five of the six incidents occurred in grain elevators and the other in a toy manufacturing plant.

The primary explosion occurred in the elevator leg in four out of six cases.

The probable cause was identified in only two cases, lightning and a hot pulley shaft.

Fuel sources were identified as corn (4), cornstarch, and wheat.

The grain dust explosions occurred in Iowa (2), Illinois, Rhode Island, South Dakota, and Texas.

Estimated property damage amounted to \$415,000.00.

Appreciation is expressed to the many persons who provided the information that allows us to build a data base on grain dust explosions that does not exist in any other industry in the U.S.

Robert W. Schoeff  
Dept. of Grain Science & Industry  
Kansas State University  
Manhattan, KS 66506-2201  
January 8, 1993

\*This report subject to revision as additional information is received.

## REPORTED GRAIN DUST EXPLOSIONS IN U.S. - 1992\*\*

<u>NO.</u>	<u>DATE</u>	<u>COMPANY AND ADDRESS</u>	<u>FACILITY</u>	<u>DAMAGE*</u>	<u>KILLED</u>	<u>INJURED</u>
1	June 3	Hasbro Inc. Center Falls, RI	Toy Manufacturer	Minor	0	2
2	June 9	Farmers Co-op Prairie City, IA	Grain Elevator	Minor	0	0
3	Aug. 7	Austwell Farmers Co-op Austwell, TX	Grain Elevator	Moderate	0	1
4	Aug. 10	Agri-Industries McGregor, IA	Grain Elevator	Moderate	0	3
5	Aug. 25	Consolidated Grain & Barge Mound City, IL	Grain Elevator	Moderate	0	0
6	Aug. 28	Lake Preston Co-op Lake Preston, SD	Grain Elevator	Minor	1	2
TOTALS					1	8

\*Minor - Less than \$50,000  
 Moderate - 50,000 - \$500,000  
 Severe - Over \$500,000

Robert W. Schoeff  
 Kansas State University  
 Manhattan, KS 66506-2201  
 January 8, 1993  
 in cooperation with  
 Ralph Regan, FGIS,  
 USDA, Washington, DC

\*\* This report is subject to revision as new information is received.

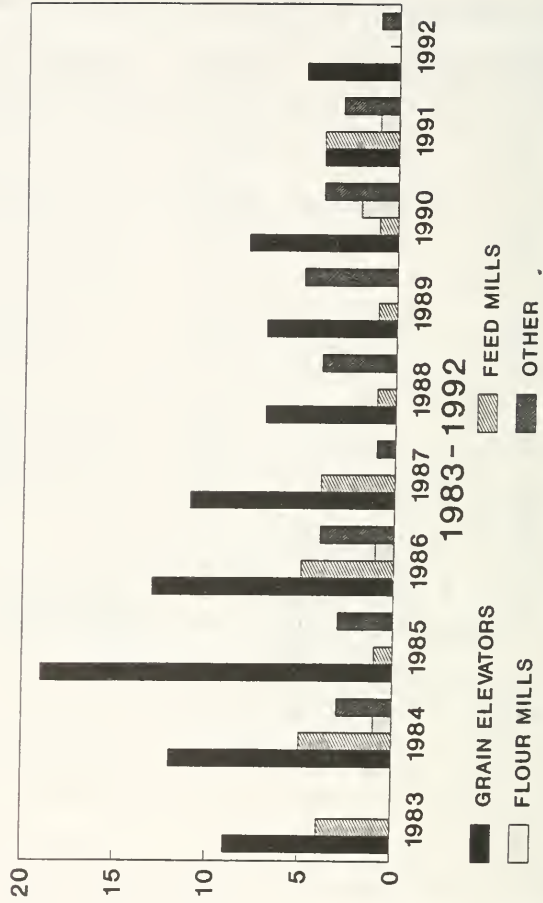


## U.S. GRAIN DUST EXPLOSION STATISTICS\*

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	TEN YEAR TOTAL
Number	13	21	23	23	16	12	13	15	12	6	154
Dead	0	9	4	2	0	8	2	0	1	1	27
Injured	14	30	20	14	18	10	7	7	4	8	132
Est. Damage to Facility (\$ Mil.)	3.6	19.9	65.0	1.6	8.3	8.7	3.9	5.0	.3	.4	116.7
Type of Facility:											
Grain Elevator	9	12	19	13	11	7	7	8	4	5	95
Feed Mill	4	5	1	5	4	1	1	1	4	0	26
Flour Mill	0	1	0	1	0	0	0	2	1	0	5
Other:											
Corn Milling, Dry	0	1	2	0	0	2	1	1	0	0	7
Corn Milling, Wet	0	0	0	0	0	0	2	1	0	0	3
Soybean	0	1	0	0	0	0	0	0	0	0	1
Rice Mill	0	0	1	2	0	1	0	1	1	0	6
Oat Mill	0	0	0	0	0	1	0	0	0	0	1
Other	0	1	0	4	1	0	2	1	2	1	10

\*Source: Robert W. Schoeff, Kansas State University, in cooperation with Ralph Regan, FGIS-USDA, January 1993

# GRAIN DUST EXPLOSIONS BY INDUSTRIES



U. S.

## GRAIN DUST EXPLOSIONS

LEADING STATES - 1958 to Date

STATE	1958- 1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	TEN YEAR TOTAL
Nebraska	45	1	6	4	2	0	0	1	0	1	0	15
Iowa	41	0	0	2	2	2	1	3	0	4	2	16
Illinois	37	2	2	4	1	2	1	2	2	0	1	17
Texas	30	3	1	1	2	1	1	0	1	0	1	11
Minnesota	26	2	1	2	1	1	3	1	2	0	0	13
Kansas	21	0	0	1	5	0	0	3	3	1	0	13
Missouri	23	0	0	0	1	2	0	0	1	0	0	4
Ohio	15	0	0	2	0	2	0	0	1	1	0	6
Oklahoma	15	0	0	0	0	0	1	0	0	0	0	1
New York	9	0	0	0	0	0	0	0	0	0	0	0
Wisconsin	9	0	0	0	0	0	0	0	0	0	0	0

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, January 1993

GRAIN DUST EXPLOSIONS  
BY COMMODITY HANDLED AT TIME OF EXPLOSION  
1983 to Date

COMMODITY	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	TEN YEAR TOTAL
Corn	8	11	14	6	13	7	4	2	5	4	74
Sorghum	2	0	2	6	0	0	2	1	0	0	13
Soybeans	1	2	0	1	1	1	1	1	0	0	8
Wheat	0	5	0	2	0	1	0	1	1	1	11
Barley	0	0	1	1	0	0	0	1	1	0	4
Oats	0	1	0	0	0	1	1	0	1	0	3
Barley Chaff/ Malt Sprouts	0	0	0	0	0	0	0	0	0	0	1
Beet Pulp	0	0	0	0	0	0	1	0	0	0	1
Corn Starch	0	0	0	1	0	0	1	0	0	1	3
Corn Gluten Meal	0	1	2	0	0	1	1	0	0	0	5
Distillers Feed	0	0	0	0	0	0	0	1	0	0	1
Feed By-Products	0	0	0	0	0	0	0	1	0	0	1
Grain Screenings	1	0	0	0	0	0	1	1	0	0	2
Mixed Feed	0	0	0	0	1	0	0	1	0	0	3
Rice (Bran) (Flour)	0	0	0	0	1	0	0	0	0	0	1
Wheat Flour	0	0	1	2	0	1	0	1	0	0	6
Wheat (Starch) (Gluten)	0	0	0	0	0	0	0	1	0	0	1
Other	1	2	2	5	0	0	1	0	0	0	2
TOTAL EXPLOSIONS	13	21	23	23	16	12	13	15	12	6	154

Source: Robert W. Schoeff, Kansas State University, Manhattan, KS 66506-2201, January 1993

## TESTIMONY OF NATIONAL FARMERS UNION

Presented By

Allen Richard, Legislative Representative

Testimony of Allen Richard, Legislative Representative for The National Farmers Union, Presented to the Subcommittee on General Farm Commodities, October 7, 1993.

Mr. Chairman and members of the committee, My name is Allen Richard. I am a legislative representative for National Farmers Union. I am here in behalf of the 250,000 family farm members of NFU.

I have also been directly involved in a family farm for more than 30 years. That farm produces the very commodities which are directly affected by the issue of grain watering.

Mr. Chairman, National farmers Union strongly supports the Federal Grain Inspection Service (FGIS) proposed regulation which bans the use of water for the purpose of suppressing grain dust. NFU would go even further and suggest that the ban be made law through Congressional action. The proposed regulation is a giant step in the right direction. Congressional action is even better.

NFU views the language currently contained in S. 1490 as a leap backward in time. S. 1490 now contains language which would allow grain handling facilities to install grain watering systems which would be regulated by FGIS through a permit system.

National Farmers Union strenuously opposes the amendment which contains the water permit language now in S. 1490.

This amendment would not only legalize an unneeded and obsolete practice, it would be an economic mandate to all grain handlers to abandon current technological dust control advances. Those companies which do not now use watering systems would be strongly motivated to install and use them if forced by competition. The mere existence of this language, whether implemented by a single grain facility or not, puts the reputation of American grain quality at risk.

NFU members meeting at several national conventions have reiterated their policy position which states in part, "To protect and improve our reputation as exporters of American farm commodities, we support legislation which would prohibit and penalize exporters adding foreign material or moisture to any commodity for overseas shipment. Export customers should pay for shipments on a clean grain basis, just as farmers are paid on a clean grain basis."

Grain companies have experimented with using water to suppress grain dust for several years. The grain trade has generally found the practice unsatisfactory and has abandoned it. Grain handling facilities have developed other methods of dust control



which are effective and pose less risk to grain quality. In fact, at least one major grain company, Cargill, Inc. has removed itself from the practice to the point that it now warrants to buyers IN WRITING that the company does not add water to any grain it handles. Cargill also requires that companies from which it purchases grain sign a similar agreement.

In testimony before the Senate Committee on Agriculture, Nutrition and Forestry on September 9, 1993, Cargill stated flatly that the company supported a complete ban on the addition of water to grain for the following reasons:

- A) it can be harmful to grain quality;
- B) it is neither a necessary nor a prudent elevator practice for minimizing risks of grain dust explosions;
- C) there are other, better means for dealing with the environmental risks of fugitive dust emissions; and
- D) it is inherently difficult to regulate without undermining the integrity of the U.S. grain handling system.

National Farmers Union would go even further. It would be virtually impossible to regulate water for dust suppression purposes though permits or any other mechanism.

The following questions show the difficulty in insuring compliance with any permit system:

- A) What would be considered an acceptable watering system design?
- B) How would the maintenance of the system be monitored?
- C) Would FGIS have to inspect the systems and employ people for the purpose of inspecting the systems and reading the water meters on a regular basis?
- D) Who would pay for such inspection activities, the taxpayers, or would it simply mean an additional reduction in prices paid to farmers?
- E) What could prevent an elevator from running grain through the system repeatedly until it contains the maximum amount of moisture?
- F) How would FGIS detect and prove abuse?
- G) How would the reputation of American producers be affected by alleged or proven abuses?

These are but a few questions. The best answer to them is to ban the practice of water based dust suppression completely

NFU acknowledges that grain dust has been and, under certain circumstances, continues to be a problem. But it is a problem that has several solutions - all of which are more beneficial to American farmers and to America's reputation as a supplier of quality grain than the use of water.

Even the smallest country elevators must deal with grain dust. Most of them have installed pneumatic systems which pull the dust away from the grain at various stages of the handling process. The dust is stored within the facility for later disposal. Some elevators work with area farmers who spread it on their fields or pastures. In other instances, it is mixed with "screenings" and sold back to farmers as animal feed. Screenings are those damaged kernels, weed seeds and other impurities which are removed from grain through the cleaning and handling process.

If this can be done with local elevators which have storage capacities of under 100,000 bushels, then terminals which have capacities in the millions of bushels and vast financial resources should be able to solve their dust problems without adding water.

Some of you may have seen pictures of grain elevators which have suffered explosions due to accumulations of grain dust. The key word here is "accumulations." Accumulations of grain dust are simply due to bad management practices. If the people whose practices caused those elevators to explode are allowed to use water to suppress dust, does it follow that they will maintain cleaner houses? More likely it would mean that they would be about as judicious with the addition of water to grain as they are in their housekeeping.

Testimony from the International Longshoremen's and arehousemen's Union which was delivered to the same Senate Committee hearing on September 3, 1993 would indicate that only one grain firm has a strong interest in using water as a dust suppressant. That same testimony lists the concerns of a number of our trading partners and competitors with the issue. Also listed are a number of entities which indicated that they would consider stopping further purchases from ports which use water as an additive.

The Canadian Grains Commission has had the following language as part of its regulations dating back to the early 1970's:

"104. No operator of a licensed elevator shall...(d) except with the permission of the Commission, mix with any grain in the elevator any material other than grain. 1970-71-72"

TO THIS DATE, NO ONE HAS EVER BEEN GRANTED A PERMIT UNDER THIS SECTION OF THE CGC REGULATIONS.

If Canada can conduct its grain trade without using water for dust suppression and without EVER using the permit allowed in its regulations so can the American grain trade. In fact, America should go one better. This country should ban the adulteration of grain in any form BOTH legislatively AND through the proposed FGIS regulation.

The application of water to grain in the handling process, Mr. Chairman, is adulteration.

American farmers, regardless of whether or not they are NFU members do their best to provide the best quality grain possible. Anything less is reflected in the prices they receive for their product.

The opposite is not always the case. For instance, if a farmer harvests wet grain and mechanically dries it, he takes the moisture content to a point below the allowable maximum. He does this to insure that it will store safely without the risk of mold, insect, sprout, heat or other damage. The maximum allowable moisture content for wheat is 13.5 percent. That is a well established figure. Wheat will not store safely for more than a few days at moisture levels much higher than 13.5 percent. If a farmer delivers wheat at higher moisture levels, either his price will be reduced or the wheat will be refused. However, if he delivers grain at moisture levels below the allowable limits, he is not rewarded with price premiums, even though he is delivering a more reliable, less perishable product.

This is the set of rules that farmers must follow. That being the case, NFU sees no justifiable reason to allow anyone else in the grain handling chain the right to use water whether through a permit system or otherwise as a dust suppressant or for any purpose not related to processing.

In fact, National Farmers Union views the practice as nothing more than a way to cheat both the American grain producer and the person who buys the adulterated grain. It is not possible to obtain more loaves of bread from wet wheat than dry wheat. The potential for spoilage from wet grain makes it a risky purchase for both the grain purchaser and the person who buys the flour.

As in every case, the bottom line is the bottom line. In this case it is the fact that other countries will become more suspicious of American grains. They will be less inclined to purchase from us than from other countries. This will mean reduced prices paid to American farmers and greater burdens on American taxpayers because of the increased need for grain price supports.

The fact is that the very same companies which use watering systems which harm our reputation and reduce the prices other countries are willing to pay, will use this reduced demand as an excuse to offer lower prices to American farmers.

No one in National Farmers Union is naive enough to believe that this will result in benefits to anyone except the companies that adopt the practice.

Mr. Chairman, adding water to grain has nothing to do with dust. It has to do with dollars. Fewer dollars for American farmers and more dollars for the companies that want to legalize the practice.

Thank you, and I will answer any questions.

**STATEMENT OF THE AMERICAN FARM BUREAU FEDERATION  
TO THE  
SUBCOMMITTEE ON GENERAL FARM COMMODITIES  
COMMITTEE ON AGRICULTURE  
U.S. HOUSE OF REPRESENTATIVES  
REGARDING THE ADDITION OF WATER TO GRAIN  
FOR DUST SUPPRESSION**

**Presented by  
Robert L. Nooter, Director  
Governmental Relations Division**

**October 7, 1993**

Mr. Chairman, members of the subcommittee, I am honored to appear before you today to discuss the American Farm Bureau Federation's position on proposed regulations concerning the use of water as a grain dust suppressant.

My name is Robert Nooter. I am a Director of Government Relations for the American Farm Bureau Federation. I am accompanied by David Miller, our Commodity Policy and Program Specialist in the area of grains and fibers. Before addressing the particular issues surrounding the water-based dust suppression, I want to thank Congressman Johnson for his interest in this issue. We appreciate your interest in grain handling safety, grain quality issues and the effects of proposed regulations on the grain industry and grain farmers.

Farm Bureau has spent considerable time developing a position on the use of water as a grain dust suppressant. As is often the case, this involved balancing competing, sometimes conflicting, interests. Farm Bureau policy is clear in its concern for grain handling practices which are detrimental to grain quality. Our policy states:

"We urge producers, industry representatives and government agencies to work together to identify grain handling practices and procedures which cause or can lead to detrimental grain quality problems. We urge the adoption of grain handling practices which lead to improved quality of grain."

And on the surface, the idea of totally prohibiting the addition of water to grain seems to be one that the farm community could fully endorse from a quality perspective. After all, what farmer would be against a regulation prohibiting the "big grain companies" from watering down our grain. But as is often the case, the issue is not nearly that simple.



— 2 —

Farm Bureau policy is also clear about our concern for farmer and agricultural worker safety. AFBF policy states:

"We will work with federal agencies and with various safety groups in the development of reasonable safety regulations affecting farmers. We will provide leadership in the development of reasonable and responsible safety regulations at the national level."

In this particular case, the need for safe grain handling procedures appears to clash with the quest to maintain U.S. grain supplies of the highest quality. However, a simple ban on the use of water as a grain dust suppressant could be short-sighted and lead to other grain quality problems.

Our response to these conflicting needs is to call for appropriate regulation, not prohibition. Farm Bureau supports both oil- and water-based systems **if the systems conform to science-based technology**. We recommend that use of water for dust control should be regulated by FGIS through the imposition of a comprehensive "permit" system. Systems eligible for permit status should not be capable of adding more than 0.3 percent water (on a weight basis), should include sealed metering and monitoring devices, and should be subject to unannounced inspections by regulatory personnel. Evidence of tampering or malfeasance should be subject to swift, severe penalties including permanent loss of the permit.

The attributes that define grain quality are numerous. These characteristics may be ones that define the intrinsic values of the grain such as a flour content, protein levels, gluten strength, etc. Or, they may define the physical characteristics of the grain through such measures as test weight or moisture; or they may be characteristics which measure external grain qualities, such as dockage, stones, weed seeds or foreign matter. Additionally, there are characteristics which define the suitability of crops for particular functions, such as milling, storage or transportation.

Many of these characteristics are intertwined. Take moisture content, for example. Moisture content affects both the weight and density of the grain. It affects the millability, storability and the breakage susceptibility of grain. Dry grain tends to store and transport better than wet grain, but it also tends to be more susceptible to breakage than is dry grain. Unfortunately, one of the by-products of high-speed, high-volume handling of grain is the production of dust. And, in general, the drier the grain, the more dust that is produced when the grain is handled.

Control of that dust is vitally important. Everyone agrees with that. Uncontrolled dust that becomes suspended in air is extremely volatile. Confined to closed quarters and exposed to ignition sources the combination can be very

explosive. In fact, it was a proliferation of elevator explosions in the late 1970s which claimed a number of lives and caused extensive property damage that led the industry to speed up the search for successful strategies for bringing grain dust under control. It was in this context that the grain industry worked in concert with the Agricultural Research Service (ARS) to find acceptable methods for suppressing grain dust resulting from grain movement operations.

But the job is difficult. Even with renewed, concentrated efforts to control dust, there have been 154 elevator explosions since 1983 resulting in 27 fatalities, 137 injuries and over \$116 million in property losses, according to Ralph Regan, safety manager for the Federal Grain Inspection Service (FGIS). Mr. Regan notes, however, that he is not aware of any grain elevator explosions where water was used as a supplemental grain dust suppressant.

With respect to controlling grain dust, the following points should be noted:

- Mechanical bag-house systems (pneumatics) alone are generally insufficient to adequately control dust.
- Supplemental spray systems (both oil- and water-based) were developed to respond to the problems of elevator explosions resulting from dust.
- In the Pacific Northwest, air quality regulations, both interior and exterior to the facility, often necessitate the use of supplemental dust suppression systems.
- There is ARS research which outlines the proper use of supplemental spray systems.
- The Food and Drug Administration rulings and FGIS regulations in 1987 legitimized the installation of water-based dust control systems which apply less than 0.3 percent water (on a weight basis) for dust control purposes.
- Key points for dust control are legs, belts, spouts and at dumps. Supplemental spray systems have proven very effective at controlling dust at legs, belts and at the spout. Variable results have been achieved in controlling dust at truck dumps.
- In general, water is a much cheaper dust suppressant material than are mineral or vegetable oils. Ultimately, the cost of controlling dust is passed back to producers in the form of wider operating margins and lower prices.

- And, in some applications, addition of oil as a dust suppressant can have detrimental impacts on the milling and baking characteristics of some wheats.

AFBF is not alone in calling for regulation rather than prohibition. U.S. Wheat Associates, the farmer-funded export promotion arm of the wheat industry, is also calling on FGIS to regulate the use of water rather than banning it. Several foreign buyers have expressed deep concern for the expanding practice of using mineral and/or vegetable oils as grain dust suppressants. Domestically, Campbell Taggart, Inc., one of the largest users of flour in the United States, specifically states on many of its purchase contracts that "wheat which has knowingly been treated with mineral oil should not be used in the wheat mix." The use of these oils can have detrimental effects on the appearance, baking quality and end-use characteristics of flours made from wheats which have been treated with oils.

Robert Reid, former chairman of the technical committee of the Association of Operative Millers, has reported that the use of oil additives to suppress grain dust can reduce the flour yield of such treated wheat and typically reduces the Agron score (a measure of the color of the flour). Results from his company's mills show that it could easily cause them to divert 4 or 5 percent of the flour stream to a lower grade to meet customer specifications. Lower grade flours or flour that must be diverted to feed uses has significantly less value. This lower value is reflected in lower farm level prices.

In addition to the direct effects on the farm value of grain, the use of oils can have other detrimental effects. One prime concern is the effect of oil sprays on bacterial counts of refrigerated doughs. It is important to realize that we are not dealing with grain dust alone. I would like to read a description of the makeup of dust in grain.

"Grain dust is a very heterogenous mixture of organic and inorganic materials. Fungi, bacteria, pollen, insects, and mites as well as fragments of all of these and also of grain comprise some of the organic material present. In addition, silica from plants, rodent hair, and excreta from insects and rodents may also be present."

It is indisputable that oil sprays are very effective at controlling fugitive grain dust. Proponents of such sprays rightfully contend that a single spray will stay on the grain for a long time, effectively controlling dust emissions. But that is also one of the primary weaknesses of oil sprays. They not only control the dust in handling, but also act as an adhesive for the dust mixture in the flour components.

Water sprays are not long lasting. Much of the water evaporates soon after application. Water does not act as a long-term adhesive gluing the dust mixture to the grain. Water application does not adversely affect milling operations or end-use flour qualities such as Agtron scores.

AFBF recognizes that, in some cases, water has been added to grain, not for dust suppression purposes, but rather to gain economic advantage by adding weight to overly dry grain. AFBF condemns such actions. However, no limits or regulations currently exist which would define the proper limits for the use of water as a dust suppressant. AFBF supports development of appropriate limits and controls.

AFBF supports the development of a permit system to control the use of water-based dust suppression systems. Key components of such a permit system are:

- **Accurate Grain Flow Measurement:** The permitted system must have the ability to determine the current operating capacity of the equipment involved through the use of such field devices as amp meters, sonar, etc.
- **Automatic Start and Stop Additive Features:** The capability of activating electronic solenoids to control the fluid application.
- **Accurate Additive Flow:** The incorporation of a flow meter field device to determine and record the flow of liquid through the system. It should also have the capability of timing the open solenoid to record the flow of liquid through a predetermined nozzle size.
- **Accurate Modulation:** The capability of measuring and recording the current operating capacity when a solenoid is opened, and matching that capacity to the liquid flow so as to apply the targeted amount of fluid without exceeding the guidelines.
- **Accurate Logging:** The capability of providing historical records of activity for audit.

• **Additional Safeguards:**

- (1) Installation of a recording meter on the main incoming line in order to provide an accounting check of total volume vs. the sum of the individual application points;
- (2) Provisions for both the programmable controller and the control panel to be sealed or locked; and
- (3) Mandate that grain which may be subjected to dust suppression through the addition of water be required to be merchandised on a "standard bushel" or dry-matter adjusted basis.

Addition of this last safeguard would make the use of water as a dust control material a moot issue since there would be no economic incentive to add more water than was necessary for grain dust suppression. AFBF believes that this provision could be added to the permit process since application for the permit is voluntary. Grain handlers who prefer not to merchandise grain on a standard bushel basis would not be mandated to do so, but they may have to incorporate more expensive dust suppression systems utilizing pneumatics and/or oil sprays to achieve the necessary level of dust suppression.

Farm Bureau is firmly committed to finding solutions to problems which can lead to detrimental grain quality problems. Those who abuse the use of water as a grain dust suppressant should be stopped. But, we are also committed to the development of reasonable and responsible safety regulations which promote safe working conditions for agricultural workers. Let's not throw out an effective means for controlling fugitive dust in grain elevators and reducing elevator explosions simply because a few unscrupulous operators have abused the technology. Dust suppression systems which use water as a supplement to mechanical dust removal components have proven effective in eliminating the threat of elevator explosions due to dust build-ups. Appropriate guidelines for the use of water have never been implemented. It is time to do so.

Thank you for the opportunity to present the views of the American Farm Bureau Federation. We would be happy to respond to any questions you may have.



## TESTIMONY OF

KEITH R. MESTRICH  
 DIRECTOR OF SPECIAL SERVICES  
 FOOD AND ALLIED SERVICE TRADES DEPARTMENT, AFL-CIO

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

My name is Keith Mestrich. I am the Director of Special Services for the Food and Allied Services Trades Department of the AFL-CIO. F.A.S.T. represents sixteen national and international unions with members in the food processing, hospitality, beverage production and allied industries. Our affiliated unions have a cumulative membership of over 3.5 million working men and women.

Specifically, five of F.A.S.T.'s affiliates represent workers employed in the nation's grain mills, terminal elevators, export facilities and processing centers. These unions are: The American Federation of Grain Millers; The Oil, Chemical and Atomic Workers; The Retail, Wholesale and Department Store Union; The United Food and Commercial Workers; and the Transportation-Communications Union.

F.A.S.T. also coordinates a coalition of unions representing workers employed in the grain industry. In addition to the unions I named above, non-F.A.S.T. affiliates belonging to this coalition are: The International Brotherhood of Teamsters; The International Longshoreman's Association; The International Longshoreman's and Warehouseman's Union; and The Allied Industrial Workers.

It is on the behalf of these unions, and the working men and women they represent, that we are pleased to present our views on the effects of adding water to grain for dust control reasons.

THE CURRENT CONTROVERSY

Throughout the grain industry today, there is a growing controversy over the true intent of using water to control grain dust. This issue received widespread attention when the Wall Street Journal ran a cover story on the controversy earlier this year.

Reporter Scott Killman's investigation detailed how some companies were using sophisticated watering systems to douse a variety of grain products. I have attached a copy of this article to my testimony and ask that it be made a part of the record.

No one knows for sure how many companies are adding water to their grain, but the purported reason for the watering is to reduce the safety hazards associated with grain dust. Others contend, however, that the real motivation behind the watering is driven by profit-seeking.

Mr. Chairman, let me state from the outset that while F.A.S.T. supports industry and governmental efforts to suppress and control the accumulation of grain dust, we do not support the use of water as the principal method of control. The use of water, in our opinion, is nothing more than an attempt to adulterate grain, make it heavier, and hence more expensive. We view this operating mechanism as a threat to the integrity of our members' jobs and a long-term strategy of economic deception.

Quite simply, there are other, equally effective methods of dust control which we favor over the application of water.

#### HEALTH AND SAFETY HAZARDS ASSOCIATED WITH GRAIN DUST

Grain dust in the workplace represents both a health hazard to workers and a safety hazard to employees and the communities that surround these facilities. Additionally, there are regulations which require companies to implement dust control regimes. An examination of these concepts is in order.

First, let me briefly detail the health hazards associated with grain dust. Numerous studies have demonstrated that there is a positive relationship between exposure to grain dust and chronic pulmonary disease. Dust has been correlated with an increased incidence of asthma, bronchitis, and a respiratory ailment known as Farmer's Lung.

The Occupational Health and Safety Administration recommends that levels of airborne grain dust should not exceed 10 milligrams per cubic meter. Some believe grain dust represents such a high level of pulmonary risk that this level should be lowered. The State of California is in the midst of considering regulations which would adjust the state's permissible exposure limit downward to 4 milligrams per cubic meter. Several Canadian studies have justified this more stringent level.

The safety hazards associated with grain dust present an even more compelling case for suppression and control.

Grain dust is among the most explosive materials known. The correct combination of dust, oxygen and confinement when mixed with an ignition source can, and has all too often, resulted in deadly explosions. In 1977, ten grain elevator explosions in eight days resulted in the loss of 59 lives.

Following that tragic year, OSHA initiated rulemaking procedures for a comprehensive grain facilities safety standard. After a long drawn-out battle with industry and the Office of Management and Budget, OSHA promulgated a final standard regulating the accumulation of grain dust.

OSHA's standard states that grain dust must not accumulate to levels in excess of one-eighth of an inch in what are known as "priority areas." "Priority areas" are generally considered to be within fifty feet of potential ignition sources.

Hence, there is valid justification for industry's contentions that they must control dust to prevent explosions and comply with OSHA standards.

Finally, the Clean Air Act Amendments of 1990 clearly identified grain dust as a potentially hazardous environmental pollutant. Just as workers' lungs can be damaged by the inhalation of grain dust, so too can the lungs of residents near a grain elevator. Moreover, while workers are clearly most at risk in the event of a grain explosion, it can hardly be denied that community residents will be affected and harmed as well.

We have now outlined some of the industry's major contentions on why they must control and suppress grain dust. I welcome the statements from industry made in their testimony before the Senate's Subcommittee on Agricultural Research, Conservation, Forestry and General Legislation that grain dust is hazardous and must be controlled. Believe me when I tell you, Mr. Chairman, that the industry's recent recognition and public statements about the severity of the health and safety hazards associated with grain dust represent something of a new twist. I cannot begin to tell you the number of meetings I have attended where industry representatives have suggested that the hazards are hardly significant.

Industry must control the accumulation of dust and there are numerous methods of proven control which can be implemented in addition to water. The contentions of Peavey and others in the grain industry that using water is the best and most feasible method for control are not justified. Nor do we accept industry's arguments that the costs associated with other types of controls represent insurmountable barriers to their implementation.

PEAVEY'S SISTER SUBSIDIARY -- MONFORT, INC.  
AN "IRONIC HEALTH AND SAFETY TWIST"

I can hardly come to this hearing today and not point out to the subcommittee what is undoubtedly the greatest irony inherent in this entire controversy.

I find it almost shocking that the principle proponent of allowing the use of water as a grain dust suppressant -- namely the Peavey Company -- uses the safety of its workers and the surrounding communities as the reason for their support of this controversial technique.

While I certainly do not intend to question the integrity of their support for the safety of their workers, what I find particularly ironic is that their sister company, Monfort Inc., has spent years doing everything it can to evade its responsibility when it comes to worker health, safety and well-being.

Monfort is a large meatpacking concern with operations in several Midwestern and Western states. At the company's Grand Island, Nebraska plant there have been three deaths in just a few years. It is OSHA's contention that at least one of these deaths, a tragic accident where a maintenance worker's head was crushed in a hide defleshing machine, was due to the willful violation of machine guarding and electrical lock-out standards.

Moreover, Monfort's Grand Island and Greeley, Colorado facilities have been subject to repeated inspections by OSHA over the last few years. The result has been numerous citations and the issuance of more than \$1.2 million in fines.

Instead of accepting their safety responsibility, this sister subsidiary of Peavey has engaged in a campaign of litigious delay. Unlike Peavey, Monfort refuses to admit that their industry is inherently fraught with health and safety hazards. Instead, they deny any responsibility for the fatalities, amputations, injuries and illnesses; blame the workers for being too stupid to avoid getting hurt; and, according to the Congressional testimony of a former Monfort safety director, engage in a campaign of coverup, record changing and denial.

Instead of paying the fines imposed by the government and implementing control strategies, Monfort hires skilled legal counsel whose conniving and deliberate strategy of delay has frustrated the Labor Department Solicitor's Office. Witnesses forget the details of the incident, others move and cannot be located, and the strength of the case against Monfort is diluted.

The sad truth is that of the \$1.2 million in fines I noted earlier, only a few pennies in penalties have been paid. The company has not paid a dime for the death of the maintenance worker whose head was crushed; some three years after that accident occurred we're still in the discovery stage of that case.

The dichotomy in safety approaches between Peavey and Monfort, two companies under the same corporate rubric, is worth noting. The fact that these subsidiaries will pervert and manipulate their approaches to health and safety is a sad commentary on how corporate America views the protection of its workers.

#### PNEUMATIC DUST CONTROL -- A SUPERIOR SAFETY TECHNIQUE

There is a more effective method for controlling and suppressing grain dust than adding water to the product. Throughout the twelve year battle to enact a Grain Facilities Safety Standard, F.A.S.T. and the unions in our coalition supported the use of pneumatic dust collection systems as the most protective means of controlling this hazardous residual product.

Pneumatic dust collection equipment basically acts as a large vacuum, sucking up grain dust before it is allowed to accumulate on facility surfaces or become suspended in the air. These systems follow the cardinal rule of industrial hygiene by isolating the contaminant from the worker so that contact is rarely made.

Industry inherently recognizes the effectiveness of this technology. At their flagship facilities -- namely the huge export grain elevators in the Louisiana bayou, along the Mississippi River and in the coastal port cities -- the industry has installed this equipment. According to the Federal Grain Inspection Service, all 63 of these facilities have pneumatic control systems.

The results have been positive. In 1977, there were twenty grain elevator explosions which resulted in 65 deaths and 84 injuries. In 1992, the number of explosions had declined to eight, there was only one death and two injuries. Of course, we need to remain vigilant and work to prevent all accidents, but the trends since pneumatic systems have been installed have been undeniably positive.

Pneumatic systems collect dust and do nothing to affect the integrity of the product, no foreign agent is added to the grain, and the safety hazards are minimized.

While it is true that water effectively suppresses dust, there are some potential residual effects which lessen its overall adequacy as a safety approach. For instance, if too much water is added to grain, the product will spoil and lodge in the bins. The result is that the dangerous process of manual extraction may need to be performed.



Wet grain also adheres to belts and buckets inside a grain elevator, increasing the amount of static electricity in these enclosed areas. Static electricity is a potential ignition source and thus an explosive hazard.

Moreover, there is some evidence which suggests that the soaking of grain is not always uniform or complete, and that an improperly soaked load of grain can have isolated pockets of dry and potentially explosive dust.

Industry's principal argument against the installation of pneumatic dust control systems is the cost associated with their installation. However, it has been demonstrated time and again that this argument is faulty. I would like to point to three examples of this contention.

First, OSHA performed a Regulatory Impact Analysis in accordance with the grain facilities rulemaking which determined that compliance with the standard was economically feasible. That analysis highly recommended the installation of pneumatic control measures.

Second, the industry's installation of these systems in their flagship facilities demonstrates the cost effectiveness of these systems. The grain industry sells an indistinguishable commodity -- making efficiency, and not price, the basis of profit. If these systems were not efficient, why would the industry install them at their highest volume, highest output facilities ?

Finally, in accordance with the California rulemaking to lower the permissible exposure level for airborne grain dust, we have completed a detailed analysis of why we believe these systems are economically feasible. I ask that this analysis be made a part of the record.

#### PRODUCT INTEGRITY = JOBS

Now you might be asking yourself if our greatest concern is the protection of workers and communities from the health and safety hazards associated with grain dust, and if water can be an effective suppressant, why do we object to its use ?

It is really a question of integrity. When working men and women go to work each and every day, they want to have pride in the products they produce or the services they render. I know of no worker who wants to be involved in what appears to be a fraudulent practice. Our members certainly do not desire to be in positions where required work practices represent little more than deception.

We do not accept the argument that water addition is the most economic means of dust suppression. In fact, we reject it outright as a long term strategy of economic ruin. Every good businessperson knows that it is the quality of their products that leads to success and profit. We too want the companies our members work for to be profitable, but we fear that the commercial perversion of the products these companies sell will result in displaced trust, declining sales, and an eventual reduction in employment.

Adding water or other liquid supplements to grain are both problematic. Were they the only known methods of dust control, we would obviously support their use. There are equally effective alternatives, however, which have none of these residual effects.

For the reasons I have outlined above, Mr. Chairman and Members of the Subcommittee, F.A.S.T. supports your efforts and those of the Federal Grain Inspection Service to prohibit the use of water as a grain dust suppressor.

Thank you for the opportunity to present our views this morning, and I would be happy to answer any questions the committee may have.

ATTACHMENTS

"Some Dealers in Grain Water It, Making It Weight and Cost More," by Scott Killman, Wall Street Journal, 7/1/93, p.1.

Letter from Keith Mestrich, F.A.S.T. Director of Special Services, to Mr. Steven Jablonsky, Executive Officer of the California Occupational Health and Safety Standards Board, regarding the Permissible Exposure Limit for Grain Dust, dated 4/12/93.

## Soaking 'Em

### Some Dealers in Grain Water It, Making It Weigh and Cost More

Saying Dust Control Is Aim,  
ConAgra Sprays Grain,  
And Is Being Investigated

Government Prepares a Ban

By SCOTT KILMAN

STAFF REPORTER OF THE WALL STREET JOURNAL  
MYRTLE GROVE, La. — Deep in the belly of a grain terminal that towers over the Mississippi River here, a curtain of water cascades onto a conveyor belt carrying soybeans.

The spray, as powerful as a bathroom shower at full blast, is controlled so precisely that the beans absorb the water without changing appearance. By the time an ocean-going vessel has been filled with them, the beans will be 177.5 metric tons heavier. That means \$27,000 worth of what the soybean buyer gets is added water.

An investigation by The Wall Street Journal has found that sophisticated watering systems such as this, as well as much cruder versions, are spreading from Gulf of Mexico ports and the rolling wheatland of the Pacific Northwest to the heart of the Midwest corn belt. Nobody agrees on how much grain is doused, but few dispute that the practice is increasing. And government officials worry that the cost to foreign buyers, consumers and even Uncle Sam could reach hundreds of millions of dollars annually.

The practice also could threaten the reputation of one of America's biggest exporting industries. Most importers don't seem to be aware of it, but a few are noticing. South Africa, which monitors crops for dangerous molds, told the U.S. last year it wouldn't import corn from three ports where water is used. Some trading firms in Japan, the biggest buyer of U.S. crops, have discreetly called Washington's attention to the practice.

#### Sagging Barges

Some grain executives estimate that 5% to 10% of U.S. grain that is exported is wetted. In the Pacific Northwest, where the wheat that farmers sell to elevators is some of the driest in the world, the moistened crop that some elevators along the Snake River subsequently dump onto Asia-bound barges is so soggy that equipment bends or even breaks under the weight.

"I'll call up and complain," says Ray Hickey, president of Tidewater Barge Lines Inc. in Vancouver, Wash. "They'll say it's dust control."

That remark lies a key ambiguity about the practice. Wetting down grain with water is, in fact, a government-sanctioned method of controlling grain dust, which can build to explosive proportions. In one year alone, 1977, 201 grain dust explosions in the U.S. took 65 lives. The question is, are elevators or grain companies that spray water on grain doing so only to control dust, or adding more water to raise the grain's weight?

#### Government to Take Action

Grain and soybeans are allowed to contain a certain percentage of moisture — 15% in the case of corn. Thus, a corn buyer has no right to expect the grain it buys to be less than 15% moisture. This does not mean, however, that a dealer who happens to own 14.5% moisture corn is free to raise it to 15% by spraying it. Doing so is barred as "economic adulteration."

The U.S. Department of Agriculture is about to make the bar more explicit. Secretary Mike Espy has just proposed a ban on nearly all uses of water on grain. USDA officials say the move stems in part from a year-long investigation of ConAgra Inc., whose Peavey Co. grain handling unit has sprayed water on at least a billion bushels of U.S. crops in recent years.

ConAgra says it uses water only to control grain dust. Yet the nation's biggest grain dealer, Cargill Inc., uses no water; it controls dust by spraying on a thin film of mineral oil, a method so effective it controls dust without adding significant weight.

The USDA's Office of Inspector General is examining whether ConAgra's use of water goes beyond dust control. Among other things, investigators are studying activities at the Omaha, Neb.-based company's facilities at Kearney, Neb., Kalama, Ore., and Paulina, La.

#### On Tape

Aided by a whistleblower — described by a ConAgra spokeswoman as a "disgruntled" former employee — investigators also are probing grain elevators ConAgra owns in Indiana. People familiar with the inquiry say authorities have a videotape showing a crude watering system at the Terre Haute elevator. ConAgra says it has disabled the system, is cooperating, and has fired the elevator's manager.

After a grain misweighting scandal in the mid-1970s, federal employees were stationed at U.S. export terminals to collect and grade samples of grain for foreign buyers. But the supervision of interior elevators is looser. Many are trusted to collect their own samples and send them to a lab for analysis. The grade helps set the price the customer pays.

ConAgra's elevators in Indiana had their samples graded by Southern Illinois Grain Inspection Service Inc. Its president, Holger Danielson, says several employees have been interviewed by federal authorities. He says he has been told his firm isn't a target.

The USDA inspector general's office is expected to send a report of its inquiry to

## Soaking 'Em: Some Dealers Water Grain, Curb Explosive Dust but Adding Significantly to Weight

the Justice Department within days. Prosecutors may take months to decide whether to pursue the complicated case.

One problem is that the government hasn't drawn a line to distinguish the amount of water needed to make a dust-suppressing vapor from that which soaks customers. The temptation to use more water is enormous. Most grain elevators make a profit of just a penny or two on each bushel they handle. An elevator could reap another three cents from a soybean bushel by increasing its weight in water by just half a percentage point.

That would mean chicken growers pay more for feed, millers pay more for wheat and ethanol processors pay more for corn — all eventually coming out of the consumer's pocket. "This is a matter we are very concerned about," says a spokesman for poultry processor Tyson Foods Inc., a big corn user. "We refuse to deal with anyone who uses water on grain."

The Agriculture Department is worried about water because it pays elevators to store crops covered by price-support programs. By watering, elevators can raise their inventory's weight and make it appear they are storing more bushels. (Grain and soybeans are measured by weight, a "bushel" designating a set number of pounds.)

"If it isn't stopped, it could become universal," says John L. McClenathan, grain marketing vice president at Growmark Inc., a Midwest elevator cooperative that favors a water ban. "There is a significant incentive to open the valve on the water pipe to put on three or four times what is needed for dust control."

### Down on the Farm

One fear is that the practice is spreading to farmers. Farmers don't have an excuse to water their crops because they don't handle enough to worry about grain-dust explosions. But a decade ago an Oklahoma State University professor designed a simple watering system for farmers. Farmer Michael Lewis of Arkansas City, Kan., used the design to build a contraption from little more than a garden hose, valve and auger. He claims he reaped an extra \$1,400 by dousing his wheat crop. Mr. Lewis, who has stumped through China promoting U.S. wheat, says seeing a U.S. export elevator use water made him feel justified. "What I did got into the grain industry's pocket," snickers Mr. Lewis, who now raises cattle.

Outside Nez Perce, Idaho, farmer Bob Branson thinks it would be immoral to raise the moisture of his wheat if it happened to be drier than it has to be. But, he adds, "we're losing money by selling wheat that the big guys can then wet. If the government doesn't clean this up, we should gear up to do the same thing."

Here's how elevators that use water take advantage:

Because the biggest cause of spoiled grain is moisture, elevators set moisture maximums. Soybean farmers, for example, may be penalized if water makes up more than 13% of their beans by weight. The limit for wheat is generally 13.5% and for corn 15%. When corn is newly harvested, it usually is somewhat wet and has to be dried down to 15% with propane heaters. But much of the soybean and wheat crop is below the moisture ceiling when harvested.

The drier the crop, the less each kernel weighs, and the more kernels a farmer needs to make a 60-pound bushel. A farmer selling wheat that's only 11% moisture misses out on perhaps 10 cents a bushel over what he would get if the wheat had the maximum 13.5%. A farmer hauling 10%-moisture soybeans to the elevator misses out on some 21 cents a bushel, at current prices.

These crops give elevators room to add water and still stay under the limit. "The real travesty is the lost money to good farmers," says Lowell Hill, a University of Illinois professor and expert on grain quality.

### Giving Bad Weight

The first alarm about elevators using water was sounded six years ago. Intrigued by scuttlebutt about damaged barges of wheat, Lloyd Brown of the USDA's Federal Grain Inspection Service traveled up the Snake River in Washington State. He found five barge-loading elevators watering wheat. A memo naming them was routed to the Food and Drug Administration, which oversees a federal bar on "economic adulteration" of grain. But the government had just begun allowing elevators to use water as a cheap way to meet dust-control rules. Without some clear dividing line, says an FDA official, an investigation would have been too "resource intensive."

So it is business as usual at Almota Elevator Co. along the Snake River. "This is our water line," says operations manager Mark Booth, pointing at a black pipe in the musty basement of the 135-foot-tall elevator. The pipe runs from a well through the elevator to a grain spout dangling over the river. Inside the spout, out of view and beyond the point where dust is a safety concern — water meets wheat and drops onto barges.

A red logbook ties open in the glass-enclosed control booth that hangs over the dock, where 100 barges or so tie up in a good year. The log lists barges receiving up to 4,600 gallons of water, enough to conceivably inflate the weight, and thus value, of a barge-load of wheat by roughly \$2,000. Gary Behymer, manager of the closely held company, contends that figure is too high because some water evaporates. He also says one aim is to keep dust from polluting the air or river. "It is more dust

control than anything," he maintains, adding that the water is turned off if customers request it.

Farther down the river, the Central Ferry Terminal Association sprays water on wheat as it is dumped from trucks into the elevator and from the elevator onto barges. General manager Karl R. Hagman says the purpose is dust control. He says he wants limits on how much elevators can use. "It makes us look like crooks," he says.

### ConAgra's System

It is ConAgra that many big grain companies are angry at. ConAgra's spraying system gives it such a financial advantage that the rest of the industry will be forced to follow suit, they say, and the practice is so hard to detect that companies are bound to cheat. "Unless this is outlawed there will be people willing to do that," says Jason Brown, a Continental Grain Co. executive who has seen ConAgra's water system in action at Myrtle Grove, La. "This could turn into a big problem."

A 1992 letter to the Agriculture Department from the U.S. unit of Paris-based Louis Dreyfus Corp. says in part: "Failure to act on this issue will jeopardize the reputation of U.S. grains in world markets and result in lost demand for U.S. grain exports." Cargill recently began requiring elevators along the Snake River to certify that they hadn't added water to the grain it buys (though it's impossible to guarantee compliance). Archer-Daniels-Midland Co. also favors a ban.

ConAgra says the company never gave the company foreign buyer about water. But in the shadow of the Myrtle Grove terminal, which it operates in a joint venture with a unit of Italian conglomerate Ferruzzi Finanziaria SpA, a ship is waiting to take on soybeans for a firm that for the first time is asking that the beans be kept dry. (Exporters have to note on grain documents whether water has been added; the rule doesn't apply to interior elevators.)

In the terminal control room, James L. Swanson, a vice president at ConAgra's Feavey unit, pals the Digital Equipment Corp. computer that controls the water nozzles. "The grain industry is a dangerous business," he says. "Banning my system would be throwing out the baby with the bath water."

He is installing the system, which is largely his invention, across the country at ConAgra elevators. It controls nozzles so the percentage of soybeans that is water glibly as much as 0.29 percentage point.

Although the government has never established a watering standard, ConAgra says its system is based on a 1982 report by USDA scientists that raising corn's moisture level by 0.3 percentage point cuts dust by 80%. ConAgra adds no more water than 0.3% at a time, but it typically waters



soybeans twice. Mr. Swanson, retracing a tour he recently gave to an agent from the USDA's inspector general's office, notes that none of the elevators he has fitted with his water system have exploded.

#### Healthy Choice?

Ambling through the terminal, he corals workers for testimonials. "There is less chance of an explosion, so I feel safer," says Benito Castiglione, a 25-year veteran.

In an office with pictures of grain terminals and a "No Snivelin'" sign on the walls, Mr. Swanson does the math. Taking evaporation into account, his system can cost the buyer of a 2.5 million-bushel shipload of grain an extra \$37,000. "The customer pays for added water," he says. Scratch evaporation from the calculations, and the water bill hits

\$78,000. Mr. Swanson says ConAgra uses his watering system only because it saves lives; asked why he didn't develop a different dust-suppression system, he says, "Maybe I'm smarter than the rest of the industry."

The law about economic adulteration is so vague that the government would have a hard time proving Mr. Swanson wrong. Prosecutors already have failed with a smaller company.

Last August, the USDA inspector general and Nebraska authorities raided a closely held Foxley Grain Co. elevator in Fremont. Armed and wearing flak-vests, agents held a dozen workers in a room for an hour and confiscated records.

The company had rigged a hose to pour water onto a belt carrying grain. An employee was later fined as an accessory

to falsifying grain weight documents and fired. But a federal grand jury in Omaha didn't indict the company for economic adulteration. John Houston, Foxley chief operating officer, says he testified the company used just enough water to control dust. He adds that most small elevators

The case is officially open but essentially dead, since without some standard drawing a line that employees crossed, prosecutors face an enormous hurdle in proving intent to commit a crime.

The government faces a similar hurdle with ConAgra's Peavey unit, which is why Agriculture Secretary Espy is proposing a water ban to settle the matter, say some people familiar with the investigation. "I concede that the rules and regulations are so darn iffy that it is very hard to police water," says a USDA official. "Peavey will be the test case."

# FOOD & ALLIED SERVICE TRADES

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ROBERT F. HARRIS  
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Secretary-Treasurer

VIA FACSIMILIE AND OVERNIGHT MAIL  
12 April 1993

Mr. Steven Jablonsky  
Executive Officer  
Occupational Safety and Health Standards Board  
1006 Fourth Street  
Sacramento, CA 95814-3372

Re: Permissible Exposure Limit for Grain Dust

Dear Mr. Jablonsky:

The Food and Allied Service Trades Department, AFL-CIO welcomes the opportunity to participate in the deliberations of the California Occupational Safety and Health Standards Board concerning the state's Permissible Exposure Limit for oat, wheat and barley grain dust (hereinafter referred to as grain dust). FAST affiliates include several unions who represent working men and women employed in grain elevators, mills and processing facilities.

FAST affiliates representing grain workers include: The American Federation of Grain Millers; The Oil, Chemical and Atomic Workers International Union; The Retail, Wholesale, Department Store Union; The United Food and Commercial Workers International Union; and The Transportation-Communications International Union. FAST coordinates a coalition of unions representing workers employed in the grain industries. Non-FAST affiliates belonging to this coalition are: The International Brotherhood of Teamsters; The International Longshoremen's Association; and The International Longshoremen's and Warehousemen's Union.

FAST strongly supports the Occupational Safety and Health Standards Board's proposal to lower the PEL for grain dust to 4 mg per cubic meter. It is especially important to note that the Board has already extensively studied proposals to lower the PEL and determined that such action was justified. Only after ex post

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facto concerns were raised by representatives of the grain industry did the Board opt to reconsider the new standard. While we are disappointed that the state is reviewing its decision, we are confident that the determination to establish the most protective public health standard will be reaffirmed.

We believe that the following arguments can be made in support of the 4 mg per cubic meter PEL:

1. The health effects of grain dust are well documented and indicate that action is needed.
2. Compliance with a 4 milligram per cubic meter standard is technically and economically feasible.
3. Industry objections rely on the results of one study -- their own.
4. Testimonial evidence clearly indicates that the installation of collection systems results in healthier, happier and presumably more productive workers.

THE HEALTH EFFECTS OF GRAIN DUST ARE WELL DOCUMENTED AND  
 INDICATE THAT ACTION IS NEEDED

Numerous studies have demonstrated that there is a positive relationship between exposure to grain dust and chronic pulmonary disease. The Board reviewed several of these studies prior to making its determination that the PEL should be set at 4 mg per cubic meter. Following the review of these studies, the Board determined that sufficient scientific justification existed to lower the PEL for grain dust to 4 mg per cubic meter.

Following industry objections and the establishment of an advisory committee to review the PEL, several additional studies have been submitted to the Board. These studies generally indicate that exposure to airborne grain dust at levels below 10 mg per cubic meter is positively associated with chronic disease.

The only recent study examined by the Board which did not establish a positive relationship between grain dust and the concomitant health effects was that submitted by the National Grain and Feed Association. Moreover, the only support expressed for that study has come from other members of the regulated industry. It is also clear from reading the docket, that several staff members of the Board are skeptical of the NGFA study's results.

While industry representatives suggest that Federal OSHA considered and rejected a 4 mg per cubic meter PEL due to a paucity of data, they inherently acknowledge the existence of a body of scientific literature suggesting that exposures below 10

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mg per cubic meter are dangerous. Moreover, studies completed since 1986 have quantitated the effect of exposures below 10 mg per cubic meter. (1) The only recent study which does not demonstrate a positive association is the industry sponsored study.

COMPLIANCE WITH A 4 MILLIGRAM PER CUBIC METER STANDARD IS  
 TECHNICALLY AND ECONOMICALLY FEASIBLE

The principle argument advanced by members of the grain industry is that the standard is technically infeasible to attain without large financial expenditures. While the state has recognized the merits of lowering the PEL, the Standards Board recognizes that feasibility concerns must be considered.

While operational and access concerns prohibit parties such as FAST from conducting studies to refute the industry's cost-benefit studies, we feel that the following arguments should be considered by the state as it makes a feasibility determination.

1. Industry cost estimates represent a worst case scenario -- compliance can be achieved for far less money.

Industry representatives have submitted to the record studies completed by the American Feed Industry Association (AFIA) and the Grain Elevator and Processing Society (GEAPS) concerning feasibility. Both studies suggest that compliance with such a standard would represent an economic hardship for members of their industry.

Following our review of the industry supplied cost studies we contacted Airtech Industries for an independent cost estimate. We asked Airtech to estimate the cost of installing the exact same equipment in the exact same average elevator listed in one of the industry supplied cost studies. (2)

Airtech told us that they could fit the said facility with a comprehensive dust collection system that would enable the facility to comply with the 4 mg per cubic meter PEL. We were quoted a total price of \$64,398 (\$53,052 in 1988 inflation

(1) The principle studies examined by the Standards Board are Huy, et. al. and Chan-Yeung, et. al.

(2) "Technical Feasibility and Economic Impact Overview of Proposed OSHA Air Contaminants Standard on The Feed Manufacturing Industry", AFIA, p. 19-20 (1988).

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adjusted dollars) to install the system. We note that this is almost \$10,000 less than the 1988 AFIA estimate of \$73,500. Moreover, our estimate is almost \$20,000 less in constant 1988 dollars.

Our estimate, and we assume the AFIA estimate as well, were quoted at book value with no attempt to reach a purchase agreement, volume discount, etc. Our estimate truly reflects a worst case scenario.

Finally, our cost estimate assumes that no other existing dust control mechanisms exist in the facility. Since all facilities currently have to control dust levels to comply with other OSHA standards, we assume that facilities have implemented control systems that will obviate the installation of a complete system overhaul.

A copy of the cost estimate sheet we received from Airtech is included in Attachment One. We have only provided the Board with the final summary page of the quotation since Airtech will not allow their quotations to be disseminated to the public. We have complete copies of the quote on file in our office and would be glad to share them with the Board once the proper written authorization and release is received from Airtech.

## 2. The industry studies are flawed.

The AFIA and GEAPS studies are inherently flawed and present worst case scenarios. For instance, the AFIA cost estimates represent the costs of installing completely new systems rather than adapting existing systems to control dust levels. These problems have been noted by members of the Standards Board staff and have not been responded to by industry representatives.

The GEAPS study merely declares that compliance with the standard is infeasible since engineering controls are too expensive; administrative controls are simply impossible; and personal protective equipment is of a limited effectiveness. The Standards Board is correct in questioning how the grain industry is to comply with any standard since GEAPS rejects the entire hierarchy of controls. The GEAPS study is not a true statement of infeasibility, but a clear indication that the industry is unwilling to seek innovative compliance measures.

Moreover, the GEAPS study and other arguments regarding infeasibility rely completely on the analysis of existing technologies as the only available means of compliance. However, a study done by the Massachusetts Institute of Technology has argued that true feasibility determinations must factor in the "technology forcing" provisions of regulation. The MIT authors



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contend that it is inappropriate to ignore industry's capacity to innovate and reduce the costs of meeting regulatory requirements. According to the study:

...Without exception, all previous OSHA economic impact statements have estimated compliance costs relative to proven control technologies.... Limiting the cost analysis to existing technologies leads to overstatements in the incremental cost of compliance and is, therefore, wrong.(3)

3. Many firms in the grain industry have already implemented pneumatic dust control systems to control grain dust levels.

The industry itself recognizes that a comprehensive system for collecting and controlling grain dust makes sense and can be profitable. A review of the literature distributed by the makers of dust collection system lists many grain milling and processing firms as users of such systems. These firms include: Pillsbury, Cargill, Purina and Nabisco. Additionally, the state of Alabama is listed by MAC Equipment Company as a customer. The fact that a state, which is undoubtedly required to complete a rigorous cost-benefit analysis, has opted to install and utilize a pneumatic dust control system, indicates the feasibility of implementing such systems.

4. The cost of such systems will come down as demand increases.

As additional firms opt to install overall dust collection systems, firms who make and install these systems will begin to realize economies of scale and be able to offer such systems at prices which may increase affordability.

One recent study indicates that compliance with standards is becoming increasingly feasible:

Dust levels in grain handling facilities have been reduced remarkably over the past two decades...This trend has been driven not only by concerns about chronic health effects of grain dust exposure, but...by concerns about grain elevator explosions.(4)

(3) ICF Inc. and MIT Center for Policy Alternatives, "Regulatory Analysis Methods: A Review of Past Health Related Efforts" (ICF Inc.: Washington, DC, 11/79, p. G3.

(4) Chan-Yeung, et. al. "State of the Art: The Impact of Grain Dust on Respiratory Health". Am. Rev. Respir. Dis. 145:476-87 (1992).

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 Re: CalOSHA Grain Dust PEL  
 p. 6

Based on these downward trends the authors of the study conclude that reductions in dust exposure to levels below 4 mg per cubic meter are "clearly achievable".

General industry experience in complying with other standards demonstrates that regulation is the mother of invention. Research completed by the US Occupational Safety and Health Administration in the late seventies concluded that when corporations are forced to redesign products and processes to meet occupational health and safety or environmental goals the redesign is often fundamental. Frequently, the new technology turns out to be better technology. It may be more productive or consume less energy. These benefits are never factored into the analyses done by industry representatives.

Finally, it is a well established principle that rudimentary cost-benefit accounting is not a perfect method for determining the overall benefits associated with occupational safety and health regulation. OSHA regulations are social, and not simply economic, policy. The consideration of regulations must take into account the unpriced benefits of life and health.

#### 5. Industry revenues make installation feasible.

Members of the grain industry are the only ones with access to broad estimates of financial data within the SIC codes covered by the proposed PEL. In arguing against the 4 mg standard, the industry says that industry profits make compliance an impossible. We note that the industry has not given the Standards Board specific numbers to bolster this conclusion and that they only speak in generalities. We suggest that real numbers must be provided before the Standards Board recognizes this argument as valid.

We have included in Attachment Two revenue figures for the nation's largest grain trading companies. These numbers are derived from Ward's Business Directory and clearly indicate that a substantial portion of the grain industry is financially healthy. For instance, Cargill had 1992 revenues of \$42 billion; Continental Grain had revenues in excess of \$15 billion; and Bunge Corporation had revenues of \$4.2 billion.

Even smaller industries players such as the Aurora Cooperative Elevator in Aurora, NE had revenues in excess of \$90 million.

Industry commonly makes the argument that while the largest corporations do have the wherewithal to implement effective controls, the small country elevators cannot. We recognize the difficulties many small businesses may face in complying with safety and health regulation and that great care must be given to

Letter to S. JABLONSKY  
 Re: CalOSHA Grain Dust PEL  
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developing achievable regulatory schemes. However, consolidation is the buzzword in the grain industry and the country elevator is rapidly becoming a thing of the past. Already in the industry, the top five companies control over two thirds of the total US trade and that trend is increasing.

6. Industry estimates of health and safety compliance are almost always overblown.

The grain industry has "cried wolf" on compliance cost estimates before. During Federal OSHA's grain facilities rulemaking, industry representatives consistently contended that compliance with the standard would lead to widespread business failures and the closing of mills and elevators. The specter raised by industry was that small, country elevators would be unable to compete.

The cost concerns raised by industry were not supported by a regulatory impact analysis completed by OSHA. OSHA's RIA found that industry had "high balled" cost estimates and that the implementation was indeed economically feasible. OSHA's analysis indicated that, "The final rule on grain handling facilities would not cause major market disruptions and is therefore economically feasible." (5)

On the basis of their calculations, OSHA determined that only 77-120 elevator facilities would experience net losses because of the standard and that the overall effect on the milling industry would be approximately 0.02 percent. Since facilities should be in compliance with dust action levels established by this standard, the cost of complying with a PEL of 4 mg per cubic meter should be far less than the comprehensive Federal Standard which has requirements concerning confined space, bin entry, and other factors beyond dust control. OSHA also determined that the final rule would not have a disproportionate impact on a substantial number of small entities.

We have enclosed a copy of the Economic Impact Analysis chapter of the RIA as Attachment Three. Should the Standards Board desire a copy of the complete RIA we would be more than happy to provide it to you.

Since the implementation of Federal OSHA's grain facilities standard (29 CFR 1910.242), we have yet to see reference by anyone of a grain mill, elevator or processing facility being closed due to the burden of occupational safety and health regulatory

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(5) Occupational Safety and Health Administration, "Final Regulatory Impact Analysis for the Standard on Grain Handling Facilities", 12/10/87, p. I-16.

Letter to S. Jablonsky  
 Re: CalOSHA Grain Dust PEL  
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compliance costs. Consolidation within the industry has occurred due to competitiveness factors, but the result has been larger, more financially stable companies increasingly able to absorb the costs of pneumatic systems.

Moreover, the general argument that regulation is costly is not universally accepted by economists. Attachment Four contains several articles refuting the contention that regulation is only associated with costs. These articles point out that OSHA regulations on vinyl chloride and cotton dust were derided by industry as being far too expensive. However, once the standard was implemented, the industry devised affordable compliance measures.

7. The costs of complying with this standard need to be properly balanced with the benefits of installing grain collection systems.

In their petition to the Standards Board, industry representatives never indicate that there are certain benefits associated with the installation of comprehensive systems designed to lower grain dust levels in their facilities. They continuously mention the costs of compliance but never give an actual cost and benefit accounting of such installation.

However, other industry publications have highlighted the potential economic benefits associated with large collection systems.

In a 1981 NGFA publication entitled "Dust Control for Grain Elevators", an industry representative notes that large dust collection systems can be cost advantageous:

Initial design considerations must encompass a selection of dust control system sizes, arriving at an optimum combination of large single systems and multiple small systems.... The advantages of large single systems are lower initial installation costs, due to lower equipment cost per unit of air handled, and a smaller number of electrical power and control devices.(6)

Additionally, numerous studies conducted by industry representatives and others suggest there are other offsets associated with installing collection systems. For instance, the

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(6) "Integrating Dust Control with Elevator Design" in Dust Control for Grain Elevators. ed. National Grain and Feed Association: Washington, 1981, p. 24.

Letter to S. Gershon;  
 Re: CalOSHA Grain Dust PEL  
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possibility exists for selling the collected dust. (7) As long ago as 1979, Robert Pacquer of Simmons-Pacquer Industries indicated that there was a market for pelletizing collected grain and selling it as animal feed. We think that such possibilities will be pursued by the grain industry to balance the costs of installation and that these considerations must be factored into any feasibility calculations.

Ruttenberg, et. al. have cited numerous instances of regulatory compliance resulting in productivity and profitability increases. (8) Several studies outlining these principles are included in Attachment Four. These studies refute the notion that regulation reduces productivity -- they should be scrutinized by the Board as it considers the feasibility of lowering the grain dust PEL.

Federal OSHA also acknowledges that feasibility determinations cannot be made simply by calculating the economic costs associated with implementation of new systems. As recently as March 30, 1993, OSHA reaffirmed this contention:

OSHA believes that problems associated with cost benefit analysis militate against its use in safety rulemaking.... There are costs to cost benefit analysis... one cost is bad decisions resulting from endowing the estimated numbers with too much confidence and tending to ignore unquantified aspects....

Moreover, in OSHA's judgement, its statutory mandate to achieve safe and healthful workplaces for the nation's employees limits the role monetization of benefits and analysis of extra-workplace effects can play in setting safety standards.... "Congress understood that the Act would create substantial costs for employers, yet intended to impose such costs when necessary to create a safe and healthful working environment. Congress viewed the costs of health and safety as a cost of doing business." American Textile Mfrs. Inst. v. Donovan, 452 U.S. 490, 5190522 (1988). In sum, there are significant limitations to formal cost-benefit analysis, both in its capacity to order decision-making and in terms of its relation to achievement of the statutory purposes. (8)

(7) Robert E. Pacquer. "Dust Control", 1979.

(8) Ruttenberg, Ruth, "Why Social Regulatory Policy Requires New Definitions and Techniques for Assessing Costs and Benefits: The Case of Occupational Safety and Health", Labor Studies Journal, Spring 1981, pp. 114-123.

(8) Occupational Safety and Health Administration; "Control of Hazardous Energy Sources (Lockout/Tagout): Final Rule and



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 Re: CalOSHA Grain Dust PEL  
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INDUSTRY OBJECTIONS RELY ON THE RESULTS OF  
 ONE STUDY -- THEIR OWN

The grain industry has objected to the implementation of a 4 mg per cubic meter PEL and has argued that the scientific evidence supporting such a level is inconclusive. They purport that the state of California has relied on only a handful of studies in making their determination. We find these arguments a little astonishing since the industry's position is based principally on the results of their sponsored study.

State officials reviewing this study have found problems in the methodology and conclusions of the study (See 6/1/92 Chu memo to John Howard and undated McDermott memo to Chu). The rejection of the 4 mg/3 level based on the results of this one study we feel would not be warranted -- especially when a significant number of independent studies exist which contradict the conclusions of the industry study.

TESTIMONIAL EVIDENCE CLEARLY INDICATES THAT THE INSTALLATION  
 OF COLLECTION SYSTEMS RESULTS IN HEALTHIER, HAPPIER AND  
 PRESUMABLY MORE PRODUCTIVE WORKERS

During a recent interview, Mr. Bruce Lagroon, an employee of the Bunge Elevator in Salina, KS. Mr. Lagroon presents the difference between working in a grain facility before and after the installation of collection equipment. His statement is ample justification for the installation of equipment to achieve the most protective standard possible.

During that interview, Mr. Lagroon made the following statement:

I remember in the mid-1970's loading rail hopper cars, standing on top of the cars and checking the grain level with a broom stick because the dust was so heavy you couldn't see the top of the car. Now we have a comprehensive dust control system and the people loading at our plant are in control rooms 12 to 14 feet away from the loading spout and have no problem seeing the grain level in the rail cars.

Lagroon consistently noted how much better the working atmosphere was in his facility. Regardless of any and all other economic

Supplemental Statement of Reasons", Federal Register, Vol. 58,  
No. 59, March 30, 1993, p. 16622.

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arguments in favor of this proposal, his testimonial evidence is demonstrative of the reasons CalOSHA should implement the 4 mg PEL.

Study after study documents that exposure to grain dust has adverse health effects. The State has already determined that adequate reason to implement a lower PEL exists. The lone remaining question is a feasibility determination. We have presented a number of arguments refuting industry contentions that such a standard cannot be attained and contend that it can in fact be attained. We believe it is up to the industry to appropriately demonstrate that the lower PEL is unattainable.

We applaud the state of California for taking proactive measures to reduce occupational exposures to this hazardous and noxious material and are prepared to work with the state to develop the necessary procedures to ensure the implementation and enforcement of the new regulations.

Sincerely,

Keith R. Mestrich  
 Director of Special Services

Attachments

Statement of

**LARRY CLARK  
SECRETARY-TREASURER  
LOCAL 40  
INTERNATIONAL LONGSHOREMEN'S &  
WAREHOUSEMEN'S UNION**

before the

**U.S. HOUSE OF REPRESENTATIVES  
COMMITTEE ON AGRICULTURE  
SUBCOMMITTEE ON GENERAL FARM COMMODITIES  
THE HONORABLE TIM JOHNSON, CHAIRMAN**

**HEARING ON THE PROPOSED BAN ON GRAIN WATERING**

**Thursday, Oct. 7, 1993**

I am Larry M. Clark, executive secretary-treasurer and welfare officer of the Supercargoes and Clerk's Local 40 of the International Longshoremen's and Warehousemen's Union (I.L.W.U.) in Portland, Oregon.

Last month, I completed my 40th year working on the waterfront in deep-sea ports along the Columbia River in both Oregon and Washington, and on the Oregon coast. During these 40 years that I have worked in the maritime industry, I have served in excess of 20 years in the category of supercargo, which are responsible for the safe, efficient and proper handling of cargoes being loaded to or discharged from ocean-going vessels.

For much of the time during those 20 years I was charged with the responsibility of loading bulk grain into vessels at the seven export grain elevators on the Columbia River. I can safely say that I have directed the loading of over 500 vessels with bulk grain destined for various ports throughout the world. During this time I have become knowledgeable about many facets of the export grain industry and of the needs and wishes of customers who receive bulk grain shipped from the grain-producing farmers in the United States.

The primary concern of the consignees who buy this American grain is its quality. The American farmer has produced a product second to none in the world and are deserving of government protection to ensure that the grain is not

contaminated or down-graded after harvest and that those valuable markets are not lost to either the American farmers or to the United States economy. Corporations and executives who are only interested in their own personal profits should not be allowed to jeopardize this critical and important economic export industry.

My union supports the ban on grain watering proposed by the Federal Grain Inspection Service. The I.L.W.U. represents approximately 500 workers who are directly employed in the grain industry, both in dockside and shoreside operations at nine export facilities on the West Coast, centered in the Columbia River region of Washington and Oregon. At the Peavey grain elevator (owned by ConAgra) in Kalama, Washington, cited as one of three export elevators in the nation where grain is watered, we represent longshoremen working on dockside operations and 27 employees engaged in shoreside operations.

We support a ban for the following reasons:

1. The documented detrimental effect of watering on grain quality, including the promotion of mold, microbial contaminants, insects and rodents, and on the reputation of all U.S. grain.
2. The negative effect on overseas markets if buyers feel they are being cheated by exporters surreptitiously adding water to increase profits.
3. The unfair advantage gained by one company adding water to grain to increase its profits, which may encourage other companies to adopt similar unscrupulous practices to remain competitive.
4. The existence of alternatives to watering that have proven safe and effective in controlling grain dust without gouging buyers, damaging grain quality or shrinking markets.

### **Loss of Markets**

The loss of markets will eventually be felt on American shores as the demand for farmers' production decreases, prices fall and fewer workers are needed to move the grain by rail, barge, in elevators and on docks.

In my experience grain-loading, the damaging effects of water are universally recognized by those responsible for delivering grain shipments to overseas destinations. Even a moderate rainfall equivalent to the rate of one-half inch per 24-hour period is enough to send the ship's officers scrambling to close the hatches to

*prevent rainwater from getting on the grain.* I can recall reports from dissatisfied buyers complaining that the grain was so wet when it arrived it had sprouted in the ship's hold and turned green!

A Wall Street Journal article (July 1, 1993) stated that trading firms in Japan, the largest buyer of U.S. crops, "discreetly called Washington's attention to the (grain-watering) practice." Another article quoted a Japanese wheat buyer telling Canadian producers that they preferred their grain to that of the United States (Billings [Mont.] Gazette, Aug. 15, 1993). Grain watering dilutes one of the major advantages that U.S. wheat enjoys—relatively low moisture content—compared to competing export countries, such as Canada and France.

The use of water is opposed by the European Community Seed Crushers and Oil Processors Federation, the Director of the Japan Oilseed Processors Association, and the Mielieraad Maize Board—a South African corn importer that told the FGIS it would no longer purchase corn from U.S. export ports where water is added. Many other U.S. companies have also apparently asked the FGIS to prohibit the addition of water to grain.

The halt in exports to South Africa directly hurts American workers like our members in Kalama, Washington, where corn is a major export. Recent articles in the Wall Street Journal and The Journal of Commerce & Commercial have explored the issues involved in declining grain exports, and the reduction in work for American workers. With a multitude of factors working against U.S. exports, we can ill afford to hammer another nail in the coffin by appearing to cheat buyers.

### **Water For Profit**

It has become increasingly clear that the use of water, ostensibly to control dust, is not designed to improve health and safety conditions at elevators, but to increase profits. ConAgra has never shown that it is necessary to use water instead of other means to control dust for health, safety or environmental reasons. The company's main defense seems to be only that other dust control methods are *more expensive*, not less effective, safer or better for the grain. In fact, ConAgra explicitly acknowledged in earlier testimony on the Senate side that its pneumatic systems *are* effective.

It appears that the real reason ConAgra adds water is to generate additional profits of up to \$50,000 per shipment by adding a mere one-half of one percent of water weight to a 50,000 metric ton vessel. The examples of grain-watering uncovered in the USDA investigation, such as spraying grain with fire hoses;



continuously adding water until the grain reaches the maximum moisture level allowed by law; and applying water at the wrong locations for dust control, with improper equipment and at excessive rates, clearly show the intent of the practice is profit-rather than safety-motivated.

At the Peavey elevator in Paulina, Louisiana, water is applied to the grain both coming and going, and at the same spot where a vacuum dust system operates to remove dust during loading and unloading, according to one employee.

### Safety

The I.L.W.U., along with other labor unions, has long fought for standards that will make our workplaces safer and healthier. We have supported the efforts to improve health and safety in the grain industry through the use of vacuum systems, better elevator design, improved training, slower loading, dust control suppression, and tougher regulations and enforcement by the U.S. Occupational Health and Safety Administration (OSHA).

We favor any reasonable method to improve the health and safety of the workplace, and support the continued use and development of dust suppression systems. At the Peavey elevator in the Port of Kalama where our members work, an effective vacuum dust removal system is in place. Although Peavey claims this system is "expensive," the company charges a dust control fee of \$21,000 per Panamax vessel. Annual revenues for Peavey from this dust control charge are estimated at \$2.12 million.

Present alternatives are better solutions to dust problems. One study has determined that soybean or mineral oil applied at minute levels, far less than that required with water applications, reduced dust by more than 90 percent for long periods of time. Industry experts tell me that proper dust control can be achieved with only one to one-and-one-half gallons of oil for every 1,000 bushels of wheat, an application which controls dust for up to six months. Also, the use of mineral oil is self-regulating because its cost is three times that of the grain to which it is applied.

ConAgra claims it can't use mineral oil because some buyers don't want it. However, that seems to be a minor issue involving only a minuscule percentage of all grain transactions, especially for export. At the Peavey elevator in Kalama, the need for alternatives to mineral oil is almost nil—we export very little of grain like malting barley, onto which buyers don't want mineral oil applied. In fact, more than 95 percent of the grain exported there is seed corn.

We are pleased to see that ConAgra has become a recent convert to the issues of worker health and safety, and the necessity to control grain-watering. This public stand is in great contrast to Peavey's role in the 1970s, when the company fought tooth-and-nail against new grain safety standards supported by labor unions. In fact, those regulations are weaker today because of the success of lobbyists for Peavey and other companies.

The past record of ConAgra on health and safety issues raises the question of whether the company is opportunistically using the issue as a cloak for practices that produce millions of dollars in ill-gotten profits.

We hope that in 1993, when Congress and the federal government has an opportunity to safeguard and improve the reputation of American grain and save American jobs, ConAgra will not succeed in "watering-down" a badly needed ban on indiscriminate grain-watering.

**INTERNATIONAL  
LONGSHOREMEN'S  
& WAREHOUSEMEN'S  
UNION**



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DAVE ARIAN  
President

BRIAN McWILLIAMS  
Vice President

THOMAS TRASK  
Vice President

LEON HARRIS  
Secretary-Treasurer

October 8, 1993

The Honorable Tim Johnson  
Chairman, Subcommittee on General Farm Commodities  
Committee on Agriculture  
U.S. House of Representatives  
Washington, D.C. 20515

Dear Mr. Chairman:

With your permission, Mr. Larry Clark, Secretary-Treasurer of I.L.W.U. Local 40 would like to submit the attached addendum to his statement before the Subcommittee on General Farm Commodities on October 7, 1993. As you know, the International Longshoremen's and Warehousemen's Union strongly opposes the language on grain watering contained in the Senate bill (S. 1490). We support a complete ban on the use of water to control dust through legislation and regulation.

Present alternatives are better solutions to dust problems. We urge Congress and the Federal Grain Inspection Service to preserve American jobs and restore the reputation of American grain by banning the use of water for dust control purposes.

Thank you for your consideration.

Sincerely,

Lindsay McLaughlin  
Washington Representative

att.

Addendum to Larry Clark's Testimony, October 7, 1993

In opposing a ban on the use of water, Peavey has claimed in its testimony that mineral oil-based systems are not a suitable alternative. The reasons Peavey gave are: expense, opposition by buyers, lack of effectiveness and loss of quality. However, the ILWU has learned that Peavey already uses mineral oil for dust control purposes at one of its large export elevators, Connors Point, in Superior, Wisconsin.

In fact, according to an elevator employee, Peavey switched from water to mineral oil for dust control within the last year.

The employee, a member of the American Federation of Grain Millers Local 118, said that Peavey spent a lot of money building an elaborate watering system last year to spray water on grain during unloading operations. But, the employee said, Peavey never put the water system in service, and instead began using mineral oil to control dust during unloading, in addition to the existing vacuum dust control system.

The employee said the mineral oil is the equal of, or better than, water in controlling dust. "They (Peavey) said it (water) was for dust control but it was to add extra weight," the employee told the ILWU.

The fact that Peavey has already switched one of its elevators from water to mineral oil for effective dust control completely contradicts Peavey's contention that a ban on water would do irreparable harm to its business operations.

We feel it is important for members of Congress to have all the facts in their deliberations over the proposed ban on the use of water in the grain industry.

September 21, 1993

The Honorable Kika de la Garza  
Chairman  
Committee on Agriculture  
U.S. House of Representatives  
Washington, D.C. 20515

Dear Mr. Chairman,

As major merchandisers and exporters of U.S. grains, we are writing to you to support the reauthorization of the Federal Grain Inspection Service. We also write in support of a complete ban on the addition of water to grain.

We oppose the addition of water to grain because it harms the reputation of U.S. grains in world markets. Even if applied in minute amounts, the addition of water, especially if done at multiple points in the grain marketing system, adversely affects the quality of grain. Since much of U.S. agriculture's prosperity is tied to its performance in world markets, practices that could jeopardize the U.S. reputation for providing quality grains pose an intolerable risk.

While a spray of water may be an effective grain dust suppressant, it is not the only means available to control grain dust. There are other -- better -- management practices for minimizing the risks of potential grain dust explosions, and they have become the standard throughout the U.S. grain handling system. Systems that add water are the exception.

Some suggest that water systems be allowed to exist under federal regulation. We believe that the federal government cannot effectively regulate this practice. It is neither physically possible nor economically sensible for the Federal Grain Inspection Service to attempt to regulate the practice at roughly 10,000 U.S. grain handling facilities. This is even more true for on-farm use of water-based systems.

Thus, we support the Federal Grain Inspection Service banning the addition of water to grain. Doing so will send a strong message to U.S. grain handlers and foreign buyers that the United States is committed to maintaining the highest standards of weight and quality inspection in the world.

Sincerely,

Archer Daniels Midland  
Bunge Corporation  
Cargill, Incorporated

Continental Grain Company  
Louis Dreyfus Corporation



## Farmland

**Farmland Industries, Inc.**  
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H. D. Cleberg  
 President and  
 Chief Executive Officer

October 7, 1993

Honorable Tim Johnson  
 Chairman  
 Subcommittee on General Farm Commodities  
 Committee on Agriculture  
 U.S. House of Representatives  
 1301 Longworth House Office Building  
 Washington, D.C. 20515

Dear Mr. Chairman:

I am pleased that your Subcommittee will hold a hearing on October 7, 1993 to receive comments on the Federal Grain Inspection Service's proposal to prohibit the use of water to suppress grain dust. Farmland Industries, as a major cooperative grain merchandiser and as a representative of our grain producer-owners, would like to take this opportunity to share our views with you in this matter.

Farmland strongly believes handling operations which add water to grain - including the addition of water to suppress dust - should be banned. The use of water as a carrier for pesticide application or drying or as part of processing operations such as milling or malting is appropriate.

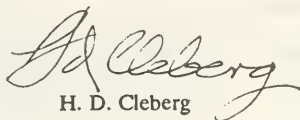
Prohibiting the addition of water to grain is a major step in maintaining and improving our competitive position in the world's grain markets. The application of water is one of several methods effective in meeting our priority concerns for protecting worker safety, health and the environment. Using water added to grain for dust suppression is seen by many in the international grain trade as an operation that reduces grain quality and inappropriately adds weight. The practice is seldom, if ever, used by other grain exporting countries.

If the use of water for dust suppression is allowed, even under a regulated permitting procedure, competitive pressures could lead to the adoption of the practice by most of our domestic grain handling industry. Even if that did not occur, an initiative to officially authorize the use of water would send an inappropriate signal to the domestic and global markets.

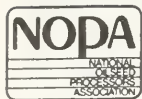
The potential for damage to the international reputation of grain produced by our farmers far outweighs any cost savings realized by a grain industry that utilizes water as part of its handling practices.

We at Farmland firmly believe that a prohibition on the addition of water to control dust is the best vehicle to assure the international grain consumer of the integrity of the U.S. grain grading system and enhance the reputation and competitiveness of grain exported from the United States.

Sincerely,

A handwritten signature in cursive script, reading "H. D. Cleberg". The signature is written in dark ink and is positioned above the printed name.

H. D. Cleberg



September 28, 1993

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Honorable Tim Johnson, Chairman  
Subcommittee on General Farm Commodities  
Committee on Agriculture  
1301 Longworth Building  
U.S. House of Representatives  
Washington, D.C. 20515

Dear Mr. Chairman:

On behalf of the members of the National Oilseed Processors Association (NOPA) I offer comment on the proposal of the Federal Grain Inspection Service (FGIS) to ban the addition of water to grain. NOPA represents U.S. processors of soybeans, sunflowerseed, canola, and flax.

NOPA strongly supports the FGIS proposed rule (F.R. Vol. 58, No. 148, pp. 41439-41441) to prohibit the addition of water to grain (as defined in 7 CFR, Chapter VIII, of January 1, 1993). Degradation to the condition and quality of whole grains with water added as a dust suppressant far outweighs any benefit that may be derived from the addition of water. We believe other suppression methods, including the use of vegetable oil as a dust suppressant, are available and effective and there is no justification for the use of water for dust suppression.

NOPA does not support a legislated ban on the use of water as a dust suppressant. The rule proposed by FGIS is sufficient to ban the practice and we feel this issue and other similar restrictions are best handled by the regulatory process rather than by legislation.

I ask that this letter be included in the record of your Subcommittee's October 7 hearing.

Sincerely,

Sheldon J. Hauck  
President

T017

JOHN MARCH  
Chairman

CHARLES BAYLESS  
1st Vice Chairman

C. LOCKWOOD MARINE  
2nd Vice Chairman

MERRITT E. PETERSEN  
1st Vice President

PATRICK E. WRIGHT  
2nd Vice President

J. RICHARD GALLOWAY  
Secretary

JOHN BURRITT  
Treasurer

JAMES W. LINDSAY  
Immediate Past Chairman

\* \* \* \* \*

SHELDON J. HAUCK  
President



**Peavey Company**  
 Peavey Building  
 730 Second Avenue South  
 Minneapolis, Minnesota 55402  
 (612) 370-7500

STATEMENT OF  
 JON A. JACOBSON  
 VICE PRESIDENT OF MARKETING  
 PEAVEY COMPANY  
 BEFORE THE  
 SUBCOMMITTEE ON GENERAL FARM COMMODITIES  
 OF THE COMMITTEE ON AGRICULTURE  
 UNITED STATES HOUSE OF REPRESENTATIVES

OCTOBER 7, 1993

Mr. Chairman, my name is Jon Jacobson and I am Vice President of Marketing for Peavey Company, a division of ConAgra, Inc. Peavey operates 90 grain elevators in the United States handling nearly a billion bushels of grain each year to domestic and export customers.

Peavey Company is firmly committed to ensuring both the quality of its grain and the safety of its many employees. To this end, Peavey utilizes a water-based grain dust control system presently in twelve of its elevator facilities. The system has been remarkably successful in protecting workers and communities from the potentially serious hazards of elevator grain dust.

We are alarmed at efforts to ban this practice just as it is achieving great technological breakthroughs. The better course is to regulate the application of water to grain for the purposes of dust suppression.

After a hearing in the U.S. Senate Agriculture Committee, the full Senate passed legislation (S. 1490) to reauthorize FGIS and to require regulation of the application of water to grain for dust suppression purposes by establishing a permit system funded by user fees. We urge the House of Representatives to adopt the Senate language.

Worker safety is the central issue in the debate over this practice. From 1983 through 1992, 154 grain elevator dust explosions and fires have claimed 27 lives and resulted in 132 injuries industry-wide according to FGIS and Kansas State University. The most recent explosion occurred in June of this year in Louisiana where five workers were injured. Peavey began using water-based systems in 1983. Since then, there have been no explosions, deaths or injuries at any Peavey elevator using a water-based system.

Water-Based Dust Suppression - A Brief History:

In 1978, in the aftermath of several devastating grain elevator explosions, the U.S. grain industry embarked upon a thorough series of research projects to determine both the causes of grain elevator fires and explosions and possible means for prevention of such calamities.



The conclusions reached in the 36 industry-funded studies pointed to grain dust as the primary fuel of these explosions and endorsed the use of liquid additives as a promising method for improved control of ambient dust by U.S. grain elevators. One of these reports, "Examining the Use of Additives to Control Grain Dust" was published by USDA Agricultural Research Service scientists in 1982 and helped form the basis of Peavey Company's current water-based dust suppression safety system.

Water-based dust suppression was recognized by the USDA Federal Grain Inspection Service (FGIS) when it issued a 1987 rule on the application of additives for dust control purposes. Water-based systems have also subsequently been recognized by the FDA, OSHA, EPA and many state agencies as a legitimate dust control practice from each of their diverse perspectives.

#### Available Dust Suppression Systems:

Peavey Company uses all three primary forms of dust control: pneumatic suction, water, and oil, depending on elevator design and end-use grain requirements. The methods are often integrated for optimum performance. As a result, we are well aware of the strengths and weaknesses of all three techniques.

#### Pneumatic Systems

Pneumatic suction systems, while generally effective at controlling grain dust, possess some shortcomings. A pneumatic system is essentially a gigantic vacuum cleaner connected to various points of the elevator known to have dangerous dust concentrations.

In addition to being extremely expensive to install, such complex systems are difficult to properly maintain, and consume a great deal of electricity. Such systems are often the focal point of elevator explosions. While pneumatic systems effectively remove dust, many elevators subsequently recombine that dust with the grain to avoid any weight loss. Dust that is not recombined creates it's own handling and storage hazards.

#### Oil Additives

The application of oil additives, either mineral oil or vegetable oil, is also a recognized dust control technique. This practice, like water-based dust suppression, was created by USDA scientists. A 1982 USDA study on additives found, that while both water and oil applications result in significant dust reductions, oil application is very slow to develop dust control as it requires extensive mixing in the grain flow. As a result, the impact of oil dust control is negligible at the most explosive and critical location of the grain elevator transfer process: the elevator legs.



Oil can also negatively impact the quality of some types of grain and its end-use applications in its processed stage. A number of U.S. flour millers, both large and small, prohibit the use of oil dust suppressants on the wheat they buy. For example, one of the largest U.S. baking companies stipulates in their contract terms that no oil is to be added to the wheat from which their flour is milled. A major U.S. brewing company has a nearly identical contract term: no oil is to be added to the malting barley which they buy. Each of these domestic buyers of grain, and its products, has identified negative impacts of oil additives on end-use quality. U.S. Wheat Associates is concerned that the elimination of water for dust control will result in increased use of oil and a deterioration of the quality reputation of U.S. wheat exports.

A second concern with oil additives, either mineral or vegetable based varieties, is the potential residual build-up through repeated additions in the grain distribution channel. While water naturally evaporates and moisture is routinely monitored, oil additives remain with the grain and go un-monitored in standard grain analysis.

Some companies have stated that research shows that the addition of food grade mineral oil at the rate of .03% by weight to corn reduces dust accumulation on the gallery floor by 90 percent. There are three problems with this statement. First, the 1982 ARS research found that .05% (not .03%) reduced dust concentration by 90% on the gallery floor. Second, explosions are most likely to occur in the leg of the elevator, which precedes the gallery, where oil is not as effective. Third, an application of .03% or .05% would be illegal since the FDA limit on oil application is at .02%. Again, oil is not a full or equal substitute for water-based dust suppression.

#### Water Additives

The greatest strength of water-based dust control is its proven ability to immediately suppress dust at grain elevator legs, as shown in USDA testing. The elevator legs contain the greatest concentration of suspended grain dust during routine operation. Virtually all grain dust explosions are chain-type reactions triggered by primary explosions at elevator legs.

Water addition at the leg dramatically reduces the fine dust particles and increases the moisture content of the dust, thereby lessening the grain dust's explosion ability. Additionally, water addition decreases electrostatic activity within the leg reducing ignition source volatility. Clearly, water-based dust suppression is an important safety practice at this critical point.

Peavey's outside insurance underwriters agree that water-based systems, when utilized in combination with pneumatic suction systems, present a preferred approach to controlling dangerous air suspension and accumulations of grain dust.

Water: A Natural Component of Grain:

All grain shipments contain a weight component in the form of moisture. Moisture is measured at every transaction level in the commercial chain: from farmer to handler, from handler to domestic processor or exporter, and from exporter to foreign buyer. The moisture weight, as a percentage of grain, is a visible part of every commercial transaction.

Moisture is introduced to grain and to grain products through a broad variety of common practices. Moisture content can be intentionally raised by sophisticated aeration systems and outdoor grain storage while unintentionally raised by routine river barge transportation of corn and soybeans to New Orleans.

Water utilization does have a minimal impact on the weight of the grain, as recognized in the USDA/ARS research of 1982. Peavey Company carefully controls the amount of water applied and the company's written policy is to use water exclusively as a means for dust prevention.

The company currently takes extreme precautions to ensure the proper use of water, including the use of computer controlled systems that keep water application below the self-imposed USDA Agricultural Research Service demonstrated effective levels for the safe reduction of grain dust -- three-tenths of one percent (.3%). Through experimentation with new technology we continue our efforts to maintain effective dust control while decreasing the water requirements. We believe that less than fifteen-one-hundredths of a percent (.15%) is the net amount of moisture now added by our process after evaporation. This amount is put in to perspective by research which shows that routine river barge transportation of corn and soybeans from the upper Mississippi to New Orleans' export terminals will raise the moisture content from .2% to .3% in most months of the year.

Current Innovation:

The latest generation of water-based dust suppression systems is currently in the final developmental stages at our Council Bluffs, Iowa, grain elevator. In addition to the computerized control systems we have in place at other locations, we have introduced high pressure atomizing nozzle hardware. The objective is simple -- to continue our progress on maximizing dust suppression, while simultaneously reducing the amount of water required. The preliminary results in meeting this dual objective are highly impressive. As a result of this type of technological progress, this would be especially poor timing for prohibition.

Scientific Limit Should Be Established:

While FGIS and FDA recognized this safety practice long ago, neither has ever established a numerical limit on the practice. We believe water utilization to grain should be regulated through the establishment of strict limits, automated systems and strong enforcement of such limits.

- FDA has set a maximum on the amount of mineral oil additives which can be added to grain for dust control.
- EPA has set limits on fumigants, pesticides and fungicides that may be added to grain.

There is strong precedent in the industry for FDA and USDA to set a limit on permissible water addition for dust control. We think the ARS research level would be a good application level to use. This level could be made even stricter by making the .3% of water by weight a total limit so that all applications within an elevator could not exceed this amount when all are added up.

#### Producer's Aspects:

Such elevator cost considerations are of rising significance in the eyes of U.S. grain producers. While minor operating cost increases at their local elevator are normally absorbed, major cost increases are consistently passed back to farmers in the form of lower prices for their grain.

As a result, progressive producer groups are generally in favor of water-based systems, as being cost effective, suited to end-use characteristics, and environmentally sustainable. Their membership recognizes the value of maintaining a maximum number of buying elevators in the delivery area. The American Farm Bureau opposes a ban on the use of water for dust suppression purposes.

Grain dust emissions are considered by the Environmental Protection Agency (EPA) to be a potential environmental hazard. The EPA believes that if not carefully controlled, dust will cause pollution of the environment surrounding grain elevators. This is an area of increased action by the EPA as clearly illustrated by the Clean Air Act Amendments of 1990, which will reduce permissible emissions at U.S. elevators beginning in 1994/1995.

#### Quality Aspects - No International Complaints:

There is no scientific research to our knowledge which concludes that the water addition amounts utilized in USDA/ARS research damage the quality or storage ability of grain or oilseeds. Research findings by USDA scientists have shown no resulting quality deterioration in water spray treated corn stored for one year. Additionally, it is important to look at actual experience. Properly controlled water-based dust suppression, in practice at our export elevators, has not resulted in a single related complaint. If objective science had conclusively demonstrated a negative grain quality effect, please be assured Peavey would have never begun the practice. If our buyers complained about the practice, the marketplace -- not the government, would require it to be suspended.

### Marketing Aspects:

The rule-making activity of FGIS over the last year on water utilization has resulted in increased questions from buyers which Peavey has openly addressed. While buyers in general may ideally prefer no additives for any control measure, including pesticides and fumigants, they have not been opposed to computer-controlled water utilization at our elevators.

A limited number of independent grain buyers currently specify "no water" is to be added. It is important to recognize, however, that a much greater number require "no oils" be added. Earlier this year, the FGIS Certification Rule was implemented which requires that export certificates state if water has been added for dust suppressant purposes. However, the rule does not require exporters to state if oil additives have been used.

### Peavey Regulatory Proposals:

Several months ago, Peavey responded to concerns of the Federal Grain Inspection Service (FGIS) that some grain handlers may potentially abuse the use of water. Peavey submitted two separate regulatory proposals to the USDA which would eliminate any such abuse.

First, Peavey proposed the implementation of a strict user fee funded permit system, in tandem with the use of tamper-proof computerized controls on water-based techniques, to assure the proper use of water.

Currently, the CCC examiners inspect grain warehouses twice per year. During those inspections, the CCC examiners do an audit of the elevators for grain quantity and quality by commodity. They also ensure that recording procedures are in accordance with their requirements including scale tickets, contracts, warehouse receipts, daily position records, farmer payments, and inventory records and adjustments. All bins are measured and graded. It would be both logical and simple for the CCC examiners to include a verification that a certified dust suppression system is being used in accordance with USDA procedures and that records are complete. On at least one occasion, the OIG (Office of Inspector General) at USDA has used the CCC to measure inbound versus outbound moisture.

Second, Peavey supported pricing grain at its dry weight on an industry-wide basis. This proposal has been advanced in the past by both U.S. producer and academic circles, in an effort to perfect the marketplace incentives to growers. This market approach would also address and reduce the currently uncontrolled practice of blending broad ranges of grain moisture, while improving the U.S. grain quality available to both domestic and export channels. The company plans pilot testing of dry-weight pricing shortly.

Just as official weight scales were automated in the 1970's, water based dust suppression systems can be automated in the 1990's. We have faith in the ability of the employees of the Department of Agriculture to regulate this safety practice.



Conclusion:

In the absence of a prohibition of the practice, we will enthusiastically continue water-based dust systems for the safety of our employees and facilities. The system has evolved through several generations since its USDA creation. We intend to continue to develop refinements.

Water-based dust suppression integrated with sound housekeeping practices and other dust control methods is a very effective means of protecting grain elevator workers and their communities from potential explosions, the risk of long-term health problems and environmental pollution. If the eventual decision by the government was to ban water-based systems, the long term safety of employees and local communities would be compromised.

Oil additive systems do not offer a fully suitable replacement due to their impact on quality. Pneumatic systems, on their own, do not offer a fully suitable replacement and are cost prohibitive to medium and small elevator companies.

Feasible regulatory actions to eliminate the potential for economic abuse clearly do exist. Just as elevator weight scales were automated and made tamper-proof several years ago, water-based systems can follow the same pattern. Peavey looks forward to assisting the USDA and the industry in developing a regulatory solution which will continue the superior protection offered by water-based dust suppression.

We hope the House Committee on Agriculture will take a leadership role in seeing that the House of Representatives adopts the Senate language in the FGIS reauthorization bill this year.

Thank you, Mr. Chairman.



J. ROBERT KERREY  
NEBRASKA

United States Senate  
WASHINGTON, DC 20510-2704

October 12, 1993

Honorable Dan Glickman  
United States House of Representatives  
2371 Rayburn House Office Building  
Washington, D.C. 20515

Dear Mr. Glickman: *Dan,*

Thanks for your note expressing your concern about the potential impact of the Senate-passed FGIS reauthorization bill on USDA's current investigation of abusive practices involving the use of water to add weight to grain.

Judging from the comments of USDA officials at the House hearing, and from a subsequent wire-service story I saw, there obviously is a fair amount of misunderstanding and misinformation on this issue. I therefore appreciate this opportunity to provide some history and perhaps clarify the situation.

As originally introduced on September 23, 1993, the Senate FGIS reauthorization bill, S. 1490, included a provision authorizing water use as a grain dust suppressant under a permit-based system. Although I supported the notion of a permit system, I was asked to join as an original cosponsor of the bill but declined because I believed the water/permit provision did not include additional safeguards that I believed essential.

The safeguards I thought essential were 1) severe penalties for misuse of water (including the failure to obtain a permit) and 2) some means to augment FGIS resources so that the agency would have the ability to enforce any restrictions on water use. Thus I developed an amendment imposing a \$50,000 fine for violations of the water language (this fine is 250% higher than the fine otherwise provided in the bill for any other violation of the Grain Standards Act).

My amendment also authorized FGIS to impose a user fee to cover "enforcement" costs associated with the permit system (the original bill already provided for a user fee to cover administrative costs of the permit system). The additional fee is to be paid by permit holders, rather than all users of FGIS services. The user fee portion of my amendment was prompted by concerns expressed by FGIS officials at the Senate hearing that the agency did not have the resources to police restrictions on water use. In light of the additional user fee authority, I was puzzled by a USDA official's reported

Honorable Dan Glickman  
 October 12, 1993  
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comment at the House hearing expressing his concern about the costs to the agency of the proposed permit system.

My amendment was accepted and the amended bill was considered and approved by the Senate on September 29 -- by unanimous consent.

The Senate "water" language continues to be characterized by some as a mandatory provision. That language reads as follows:

...the Administrator shall allow, through the issuance of permits, the addition of water to suppress grain dust unless the Administrator determines that the addition of water materially reduces the quality of the grain or impedes the objectives of this Act."  
 [Emphasis added.]

In my view, this language is hardly mandatory. It leaves considerable discretion to the Administrator to prohibit water use if the Administrator believes that grain quality is likely to suffer or if, for example, a potential buyer of grain objects to water use. What the language does require, I believe, is that the Administrator give objective consideration to the water option -- particularly in light of new technology -- rather than dismiss the technology out of hand.

I must say, based on early press accounts of water abuse in certain elevators, that I initially had my doubts about whether water could be used responsibly, and thought a ban was an appropriate response. What led me to conclude otherwise, however, was the development of new technology that apparently allows water to be applied in minute quantities as a mist or a fog. I am not sure if these nozzles allow water to be applied in a manner that does not harm grain quality or lend itself to abuse, but it seems to me that the technology merits an objective look -- especially in view of the underlying goal of reducing deadly elevator explosions through improved dust control.

Finally, a comment about the potential impact of the Senate language on any on-going USDA investigation: If USDA officials are concerned about the potential impact of the Senate language they have not, to my knowledge, expressed those concerns to any member of the Senate. Moreover, it is not at all clear to me that the Senate language would affect any current investigation, since the intent of the Senate language is to allow the use of advanced, high technology, water-based dust suppression systems -- not the hoses and

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other crude devices that apparently are the subject of USDA's review and should be banned. Nevertheless, I would be pleased to include additional language in the Senate bill making it abundantly clear that nothing in the bill is to hamper current USDA investigations.

I have asked the Subcommittee Chairman, Tim Johnson, to include a copy of this letter in the hearing record for October 7.

Sincerely,



J. Robert Kerrey

cc: Honorable Tim Johnson  
 Assistant Secretary Branstool



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Office of Air Quality Planning and Standards  
Research Triangle Park, North Carolina 27711

OCT 5 1993

Honorable Tim Johnson  
Chairman, Subcommittee on General Farm Commodities  
Committee on Agriculture  
House of Representatives  
Washington, D.C. 20515

Dear Mr. Chairman:

Your staff requested that we provide the Subcommittee with a letter addressing issues related to a proposed regulation by the Federal Grain Inspection Service that would ban the addition of water to grain. In particular, your staff indicated that you would like to know (1) what air pollution regulations exist with which grain elevators must comply and (2) EPA views on whether prohibiting water from grain would lead to more dust being emitted into the air.

**BACKGROUND ON PARTICULATE MATTER**

In 1971 the Administrator of the Environmental Protection Agency (EPA) identified particulate matter as an air pollutant which may reasonably be anticipated to endanger public health. Particulate matter is the generic term for a broad class of chemically and physically diverse substances (dust--including grain dust--smoke and other solid or liquid aerosols) that exist as discrete particles having a wide range of sizes. Also, as directed by the Clean Air Act, EPA has established national ambient air quality standards (NAAQS) for particulate matter at 24-hour and annual concentrations below which the risks to human health effects are believed to be small. The NAAQS for particulate matter are expressed in terms of very small particles with average diameters of less than or equal to ten microns (PM-10).

**PARTICULATE MATTER REGULATIONS**

All States and the U.S. EPA have adopted regulations to limit the amounts of particulate matter that can be emitted from fuel combustion, industrial activities and mobile sources such as cars and diesel trucks. The regulations adopted by States to limit emissions of particulate matter take a variety of forms. Most States, however, limit the density of visible emissions from

an industrial activity (expressed as the opacity of the emissions or their ability to obstruct vision) and the mass of emissions per mass of material processed (e.g., pounds of particulate matter per ton of grain handled). States may also have regulations that generally prohibit emissions of particulate matter that would cause a nuisance. EPA does not have an inventory of all State regulations that may relate to control strategies affecting grain elevators.

In 1978 EPA adopted standards of performance for new, modified, or reconstructed grain elevators with permanent storage capacities of more than 2.5 million bushels and constructed after August 3, 1978 [see 40 CFR 60.300]. The standards of performance set limits for visible emissions of particulate matter from grain loading, unloading, drying and all grain handling operations. The standards also limit mass emissions from pneumatic dust capture systems to less than 0.01 grains of particulate matter per dry standard cubic foot of air exhausted. For barge and ship unloading the standards specify that an enclosed leg (or bucket elevator) with ventilation to a control device (such as a fabric filter) be used unless an alternative method is approved by EPA.

Other than for barge and ship unloading, the EPA standards do not specify any particular control methods, though the standards were based on the performance of dust control systems in the mid 1970's. At that time, dust emissions from grain elevators were controlled by enclosing the operations (e.g., enclosed conveyors, covering ship holds) or by hooding the operations and aspirating the dust to a capture device (such as a fabric filter). Subsequently, some elevators have begun using liquid sprays such as mineral oil or vegetable oil as dust suppressants. [This includes self unloading ships, which are required to apply for an alternative emission control method, and which have for the most part selected mineral or vegetable oils.] Apparently, water spray is also used in some instances.

#### USE OF WATER SPRAY AS A DUST CONTROL TECHNIQUE

The standards of performance for grain elevators adopted by EPA do not require that water spray be used as a dust suppression method. Indeed, the use of water as a dust suppressant was not even anticipated by EPA at the time the standards were developed. However, in 1992 the EPA did approve the use of water spray as an alternative method to control dust from ship unloading at General Mills' Duluth, Minnesota elevator for barley only. General Mills applied for the water spray alternative because the grain purchaser, a brewer, requested that mineral oil not be used on the barley.

The EPA does not believe that the Federal Grain Inspection Service's proposed rule to prohibit adding water to grain would necessarily result in increased dust emissions from grain elevators. The other dust control methods discussed above can be used to comply with State and Federal air pollution emission



limits. For example, in the General Mills instance cited above, banning water would require the source to propose an approved alternative (non-water) control method, such as those mentioned above.

I hope this response has been helpful to you.

Sincerely,

A handwritten signature in dark ink, appearing to read "John S. Seitz", with a long horizontal flourish extending to the right.

John S. Seitz  
Director  
Office of Air Quality Planning  
and Standards



American Soybean Association

October 1, 1993

The Honorable Tim Johnson  
Subcommittee on General Farm Commodities  
Committee on Agriculture  
U.S. House of Representatives  
Washington, D.C. 20515

Dear Mr. Chairman:

On behalf of the American Soybean Association (ASA), I appreciate the opportunity to comment on legislation proposed by the Senate Committee on Agriculture, Nutrition, and Forestry in S. 1490 to address the addition of water to shipments of U.S. grains and oilseeds. The quality reputation of U.S. soybeans is of vital importance in maintaining our foreign and domestic markets, and a top priority for American soybean producers.

The only legitimate reason for adding water to grain and oilseeds offered by commodity merchandisers and elevator operators who engage in this practice is to suppress dust. Unfortunately, instances in which excessive amounts of water are added to increase the weight and price of soybeans have been frequently documented. This practice undercuts the quality reputation of U.S. soybeans in foreign markets and encourages others in the domestic marketing system to do the same. Excessive watering can also cause major problems in processing soybeans.

Those who would continue the practice of adding water for dust suppression favor restricting the quantity which can be applied for this purpose. However, it is practically impossible to monitor soybeans handling and storage conditions, and the temptation to exceed the maximum allowable application would be too great for some to resist.

The argument has also been made that alternative dust suppressants, including mineral oil and vegetable oil, can have negative effects on quality. In the case of soybeans, we know of no drawbacks that can compare with the damage that can be done to the quality reputation of our product if excessive watering continues. ASA Board resolutions encourage grain and feed handlers and other industries to use soybean oil to control dust. We also urge the insurance industry to consider rate reductions for those using soybean oil dust control systems.

Washington Office

1000 CONNECTICUT AVENUE, N.W. SUITE 1106, WASHINGTON D.C. 20036, PHONE (202) 371-5511; FAX (202) 331-7036

The Honorable Tim Johnson  
October 1, 1993  
Page Two

Our foreign and domestic customers regularly raise serious concerns about the quality and cleanliness of U.S. soybeans. Quality can be as important as price in buying decisions. Earlier this year, reports that individual companies have added excessive water to shipments of U.S. soybeans caused substantial damage to the quality reputation of our product. It is ASA's position that the only way to repair the damage and avoid its repetition is by prohibiting the addition of water to soybeans, except for processing purposes.

Under S. 1490, adding water to grain and oilseeds would be prohibited except for the purpose of suppressing grain dust. Grain handlers and elevator operators who apply water for this purpose would be required to register and obtain permits. Violators and abusers would be subject to fines and/or imprisonment. A permit fee would be collected to recover administrative and enforcement costs.

While it provides new safeguards against abuse, this approach will not eliminate the perception that U.S. soybeans can legally contain added water. The amount of water appropriate for dust suppression is not defined, leaving the concern that excessive water could still be added. As a result, the quality of U.S. soybean shipments would likely remain subject to suspicion on the part of our foreign and domestic customers.

ASA continues to support a total prohibition on adding water to soybeans, except for processing purposes. We urge you and other members of the Committee on Agriculture to include an unequivocal prohibition of this practice in the upcoming House-Senate Conference on legislation to reauthorize FGIS.

We very much appreciate the opportunity to provide you and other members of the Subcommittee with our views on this important issue.

Sincerely,



Dennis Sharpe  
Chief Executive Officer

CONTINENTAL GRAIN COMPANY  
277 PARK AVENUE  
NEW YORK, N. Y. 10172

October 5, 1993

The Honorable Tim Johnson  
Chairman, Subcommittee on General Farm Commodities  
Committee on Agriculture  
U.S. House of Representatives  
Washington, D.C. 20515

Dear Mr. Johnson:

Continental Grain Company wishes to submit the following comments for the record of your Subcommittee hearing on the addition of water to grain. Continental Grain is a major merchandiser, handler and exporter of grains and oilseeds in the United States, as well as worldwide. Our Company has experience in dealing with most of those commodities in more than 100 markets globally.

Based on that experience, Continental Grain strongly endorses a Federal Grain Inspection Service ban on the addition of water to grain in the United States. We believe that the practice of adding water jeopardizes this country's credibility as a supplier of quality grain.

To give the world the impression that our federal government condones the practice of adding water is counterproductive to the promotion of U.S. grain exports. It was not many years ago that this country's weighing and measuring practices came under a cloud. Exporters and many others in the industry worked tirelessly over the last few years to regain the world's confidence in our inspection and weighing systems.

We believe that the proposed FGIS rules to ban the adding of water, as recently published in the Federal Register, adequately deal with this issue. We do not believe there is reason for Congress to become involved in these regulatory procedures.

Sincerely,



Bernard Steinweg  
Senior Vice President

STATEMENT OF WINSTON WILSON, PRESIDENT  
OF U.S. WHEAT ASSOCIATES, INC.  
TO THE SUBCOMMITTEE ON GENERAL FARM COMMODITIES  
FORESTRY AND GENERAL LEGISLATION  
COMMITTEE ON AGRICULTURE  
UNITED STATES HOUSE OF REPRESENTATIVES  
OCTOBER 7, 1993

Mr. Chairman and members of the Committee, I believe this is not only a very timely hearing that you are holding today but also deals with an issue which seems to have no clear-cut and totally satisfactory resolution.

U.S. Wheat Associates is very concerned about reports of excessive amounts of water being added to grain to increase weight. However, in the case of wheat, banning all uses of water--prohibiting even legitimate dust suppression uses--is not a completely desirable solution. Dealing with this issue through regulation rather than legislation would provide greater opportunity to examine the unique issues of water versus oil for dust suppression affecting wheat.

While relatively few facts uncovered by Government investigators have been published, U.S. Wheat shares the concerns of others in the industry that excessive or abusive addition of water to grain by some may be affecting grain quality and forcing competing grain handlers to respond by adding water as well. One of the major advantages that U.S. wheat enjoys compared to competing exporting countries, particularly Canada and France, is the relatively low moisture content of U.S. wheat. For the flour miller



this translates into more flour produced (and more money earned) per ton of wheat purchased. Adding water to wheat to increase its weight erodes this advantage. Simultaneously it creates the risk of adding undesirable bacteria or other materials to the grain and may create an environment for mold growth or other damage to occur. Many countries are developing an increasing awareness of food safety issues and are much more sensitive to the hazards presented by adding water to wheat than they may have been just a few years ago.

Despite these concerns about water, simply banning all use of water may create more serious consequences for the wheat industry than the ban is intended to resolve. There is a legitimate use of water for dust suppression purposes, which was well-documented by research in the 1980's. While using water to suppress dust is not nearly as desirable as removing the dust using aspiration or other cleaning processes, water as a dust suppressant is much more desirable than either mineral or vegetable oil. Water at least is a naturally occurring substance in wheat. The amount of water required to suppress dust is quite small and does not need to cause any quality deterioration.

Oil on the other hand does not naturally occur in wheat. Oil has adverse effects on flour yield and color, both important factors in determining the profitability of the milling operation. Oil can also cause bacteria and other undesirable materials to adhere to the wheat kernel, particularly in the crease of the kernel, and therefore reportedly can raise bacteria counts in flour. Because some of the oil is detectable in the resulting flour, it may have adverse effects on the quality of the end

product. Also many products are now made from whole grain, which include all the oil sprayed onto the wheat. As a result, some of the largest U.S. baking companies refuse flour from wheat treated with oil.

The issues of water and oil are closely related because there are only three methods of controlling grain dust: either water or oil can be used to suppress dust or aspiration (cleaning) can be used to remove dust. Cleaning and aspiration have very desirable effects on quality, but are said to be more expensive. Both water and oil can degrade quality, but the effects of oil on wheat as discussed above are worse than properly used water. If water is removed as a possible method, that will leave only oil and aspiration. U.S. Wheat is concerned that elimination of water as an option for dust suppression will result in more widespread use of oil with a resulting increase in multiple oil applications and deterioration in the quality reputation of wheats exported from the U.S. While most U.S. processors are reluctant to step forward to defend the use of water, they do not like to see either oil or water added to wheat. U.S. mills can avoid purchasing wheat treated with oil if they wish. This is impossible for importers who have little or no control over what happens to the wheat other than at the export point.

There are other possible methods to control the abusive use of water, short of banning its use entirely. One idea is the establishment of a permit system for water dust suppression systems. Cost of issuing permits and monitoring water usage could be covered through fees. Abuses could be controlled by using meters to record the amount of water used and comparing that with the volume of grain handled. Elevators are currently audited, and

water usage could become a part of that audit process. Some, however, argue that a permit system would be expensive to implement and maintain. As it would not actually eliminate the incentive for adding water, there would still be reasons to circumvent the controls or find ways to add the maximum amount of water allowed by the system.

Another possibility, which U.S. Wheat would like to see explored further, is changing the basis on which the weight of wheat is reported. Currently no weight adjustment is made for the moisture content of the grain. However, millers are interested in how much dry matter they are purchasing. This information could be provided by trading wheat on a "dry matter" or "fixed moisture" basis. The advantage of fixed moisture weights over dry matter weights is that the weights reported would not need to be so dramatically different from those reported currently. Reporting weights in either of these ways would provide more meaningful information to millers and more accurately reflect the value of the grain. It would also eliminate the economic incentive to add moisture to increase weight as the fixed moisture weight would not change as the result of adding water.

FGIS successfully implemented a change from reporting protein on an "as is" moisture basis to a fixed 12-percent moisture basis in 1987. The advantages of the change were similar to the likely advantages of changing the way weights are reported, namely that fixed moisture protein is more meaningful to processors. Fixed moisture protein reporting quickly became the industry standard in the U.S. and was readily understood by most foreign buyers. Conceptually the change to fixed moisture weights is very similar

and likely could be implemented by changes in the way FGIS reports weights at export points.

While there are methods of controlling water use that have not been fully explored, there also is no guarantee that banning the use of water would be fully successful in stopping abuses. FDA already bans the use of water for the purpose of increasing weight. While facilities where FGIS personnel are routinely present would be unlikely to ignore a ban, others may still respond to the incentive provided by the existing system to gain from adding water. Some growers reportedly engage in the practice of adding water to wheat, and a ban may not affect their actions.

U.S. Wheat believes that abusive adding of water to grain is a serious concern. However, questions remain about the effect on wheat quality of encouraging greater use of oil as a dust suppressant. Also, there are possible alternatives to a ban that have not been fully explored which could retain this important dust control method while discouraging abuses. Issues such as these can more effectively be addressed through the USDA regulatory process than through legislation.

This concludes my statement. I would be happy to attempt to answer any questions that you might have.



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U.S. Department of Labor

Assistant Secretary for  
Occupational Safety and Health  
Washington, D.C. 20210

OCT 5 1987

The Honorable Tim Johnson  
Chairman  
Subcommittee on General Farm Commodities  
Committee on Agriculture  
U. S. House of Representatives  
Washington, D.C. 20515

Dear Mr. Chairman:

Thank you for your letter of September 25 regarding the issue of prohibiting the addition of water to grain during grain processing operations. The Occupational Safety and Health Administration (OSHA) welcomes this opportunity to discuss its grain handling regulation.

OSHA's standard for grain handling facilities was issued on December 31, 1987. The rule was developed following a series of devastating fires and explosions in the late 1970's which resulted in considerable loss of life and property damage. It applies to most grain handling facilities and requires that employers take steps to control fires, explosions, and other safety hazards associated with operations at those facilities.

The standard requires employers to develop and implement an emergency action plan to let employees know what to do in an emergency. Employers must provide training to employees at least annually and when changes in job assignment will expose them to new hazards. Employees must be trained in general safety precautions associated with their workplace as well as in specific safety practices applicable to their jobs.

Employers must issue a permit for all "hot work" done at the grain handling facility except where the employer is present or when the "hot work" is done in welding shops authorized by the employer. Employers must also issue a permit for entering bins, silos or tanks. The permits must certify that certain precautions have been implemented before employees are allowed to enter. The standard also requires that the atmosphere within a bin, silo or tank be tested for combustible gases and vapors. Respirators must be provided when there is toxicity or an oxygen deficiency.

Employers in the grain handling industry must inform all contractors working at their facilities of potential fire and explosion hazards related to their work. The contractor must also be told about the emergency action plan and any applicable safety rules.



Preventive maintenance must be performed to control ignition sources in grain facilities. Equipment such as belts, buckets, pulleys, and milling machinery are all potential ignition sources. They must be inspected and lubricated periodically. Employers are allowed to determine the frequency of preventive maintenance in their work establishments. The standard requires procedures for locking out and tagging equipment to prevent its inadvertent use when under repair. It also requires that employers provide an effective means for removing ferrous materials from grain streams so that they do not produce sparks, which are an explosion hazard.

The provision of the standard related to the issue of water in grain handling facilities is the requirement for housekeeping. This provision is designed to keep dust accumulations and emissions under control. The housekeeping requirement is performance oriented; i.e., it specifies the goal of reducing dust accumulations but does not mandate specific means of reaching that goal. Therefore, employers retain flexibility to use methods best suited for reducing dust at their particular facility.

Manual housekeeping methods, such as vacuuming or sweeping with soft bristle brooms, may be used to remove dust. Dust which accumulates in inaccessible areas can be reached with compressed air devices or water from hoses. A frequently used method of controlling dust emissions is a pneumatic dust collection system. To work effectively this system must be designed and installed by a competent contractor. Another method of controlling dust emissions is to enclose the conveying system, pressurize the general work area, and provide a lower pressure inside the enclosed system. Some employers spray edible oil into a moving stream of grain to control dust emissions. There are a variety of dust control methods which may be used to meet the housekeeping requirements of the standard. During OSHA's rulemaking process on the grain handling standard the agency heard no evidence from employers that it was necessary to add water to the grain stream to reduce dust.

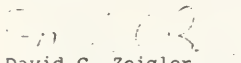
The housekeeping provisions identify "priority" areas such as floors of enclosed areas that contain grinding equipment or grain dryers. Employers must immediately remove grain dust accumulations in these areas whenever they exceed 1/8 inch.

All direct heat grain dryers must be equipped with automatic controls that will shut off the fuel supply in case of power failure or flames. Direct heat dryers installed after March 1988 must be located outside the grain elevator or located in an area inside the elevator which is either protected by a fire suppression system or is separated from other areas of the facility.

Finally, the standard requires employers to provide at least two emergency means of escape from the galleries of grain handling establishments and one means of emergency escape from grain elevator tunnels.

I hope that this information will be helpful to the Subcommittee. If I may be of further assistance, please advise me.

Sincerely,

  
David C. Zeigler  
Acting Assistant Secretary

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